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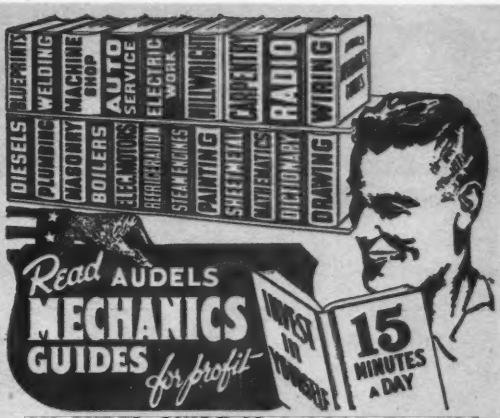

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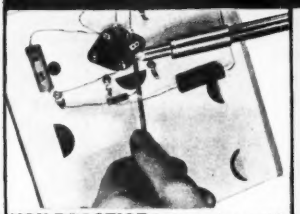

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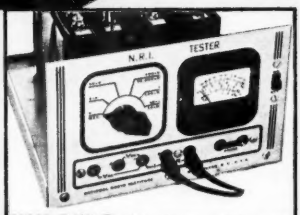

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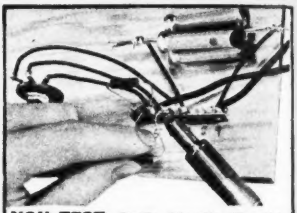

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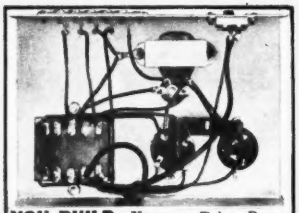

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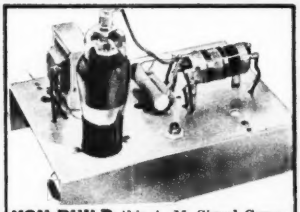

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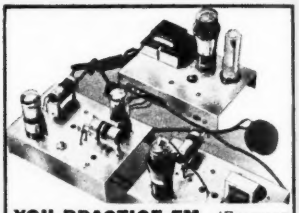

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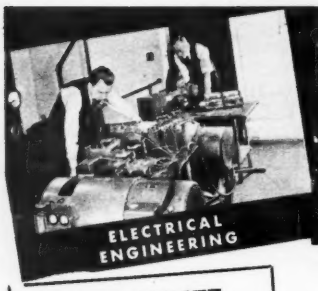

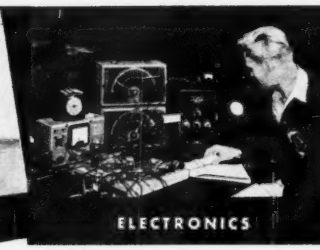

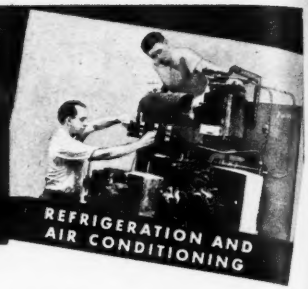

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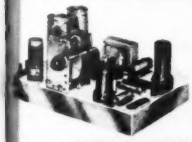

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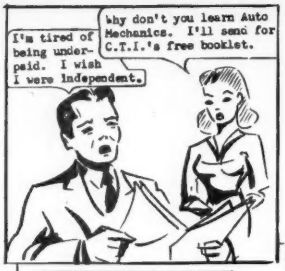

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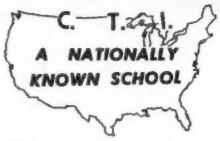

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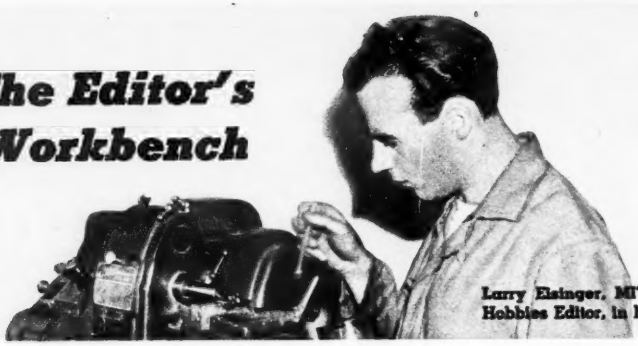
The Editor's Workbench



Larry Elsinger, MI's Crafts and Hobbies Editor, in his workshop.

Speaking of Boats . . .

Knocking around the sailing circuit last summer we ran into a number of sad-eyed citizen sailors riding as supercargo in other fellows' boats and lamenting the fact that they didn't have a boat of their own. "I've been meaning to build me one for a long time," these gents told us, "but somehow I never seem to get around to it. Maybe next spring—"

Next spring is too late to start planning a boat for next summer. And you can take that from no less an authority than the celebrated William F. Crosby, whose designs include the internationally famous Snipe class and whose most recent MI article, Building a Boat This Winter? appears on page 126 of this issue.

Now's the time to read Bill Crosby's piece on how to make next summer's dream—a boat of your own—come true. Now's the time to roll up your sleeves, sharpen up the old tools and get to work. And let's not hear any more of those alibis about "somehow I never seem to get around to it."

P. S. Good luck—and send us a picture of your dream boat when it's all finished.

. . . And Telescopes . . .

In last month's Workbench we reported on the tremendous interest you readers have shown in MI's Portable Six-Inch Telescope. Thousands—and we do mean thousands—of letters have been pouring into the office ever since the three how-to-build-it articles ran in our July, August and September issues. And we've already exhausted three printings of the free list of manufacturers from whom the necessary optical parts can be bought. (Don't worry—yours will be on its way shortly.)

So great was the response to these articles that, with this issue, MI starts a regular, monthly department devoted to the amateur telescope maker and astronomer. This month (see page 119) we discuss the equatorial mount. Future issues will deal with eyepieces, magnification, star-finding, collimating and so on. Don't miss them!

. . . And A New Book

We've been waiting a long time for this chance to announce that HANDY MAN'S HOME MANUAL (published by the editors of MECHANIX ILLUSTRATED, *60c at all newsstands) is now on sale. Its 144 pages are filled with detailed drawings and instructions on such subjects as Outdoor Furniture, Home Modernization, Furniture Refinishing, Home Workshop Material and Around the House articles. We think you'll like it.*

Dear Editor:

Here's a picture of the boat *(Barnacle)* I built from MI plans No. B. 146. The only change I made is in the oarlock. This is the most practical boat I ever had.

Joel Thunstrom
3 Balerne St.
Worcester 6, Mass.

Not only is it practical, Joel, but profitable. For your fine job on the boat, MI is sending you a $5 Workbench award. We hope you got plenty of good service out of Barnacle during the summer months.

[*Continued on page* 146]

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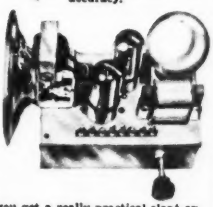

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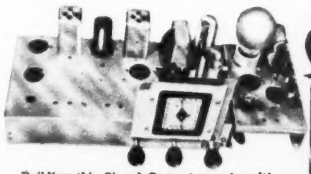

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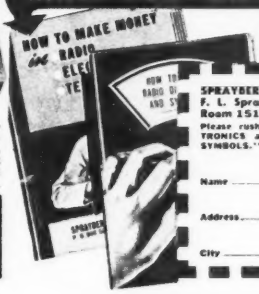

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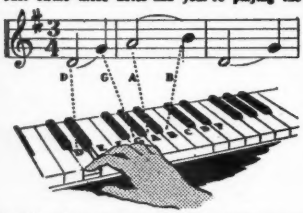

Look at the diagram. The first note of the music is "D." Following the dotted line to the keyboard you'll find "D" is the white key between the two black keys near the middle of the keyboard. Now read below how you can learn to play any instrument quickly and easily.

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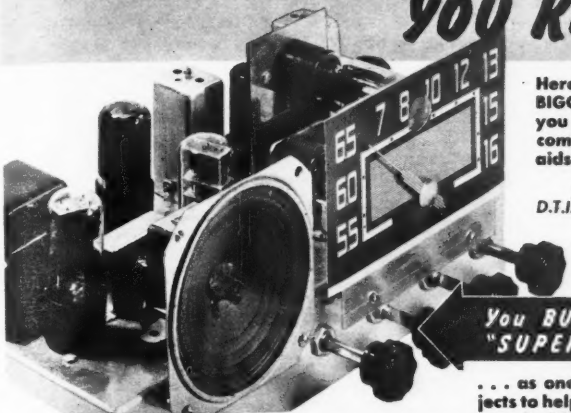

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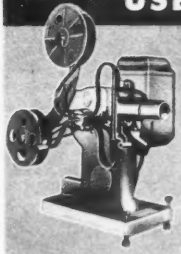

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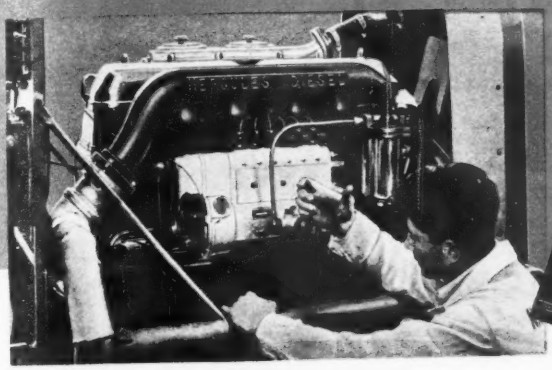

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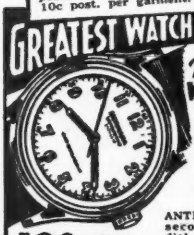

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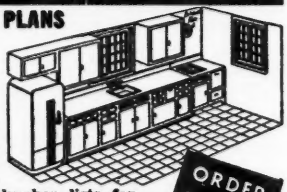

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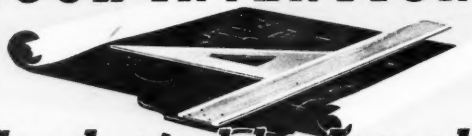

Conducted by Joseph H. Kraus

To facilitate the answering of their mail, readers desiring the advice of Mr. Kraus on inventions matters are requested to observe the following simple rules: 1) Type or write clearly, on one side of the paper. 2) Make sure that your full name and address, including street number and postal zone, if any, are on the letter and all accompanying papers. 3) Mail drawings or photographs flat, not rolled, and include postage if you want them returned. 5) Do not ask questions relating to patent laws. 6) Do NOT send models.

Address your inquiries to "Your Invention Clinic," MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y. Mr. Kraus will answer as many letters as possible in this column. His services are free.

portable fire alarm

Eugene N. Zimmerman of Chaska, Minnesota, wants to know what we think of a fire alarm made of tubing, a pressure tank and fusible plugs placed in the line. He has applied for a patent on the alarm.

ANSWER: We have a portable fire alarm that was made in France about 40 years ago. It has a small copper tube, $\frac{1}{16}$th of an inch in diameter, which you run along the ceiling of the area you want to protect. There are no fusible plugs in the line and there's no gas "pressure." The near end tees into a capillary through which the tube may "breathe" and is connected with a diaphragm that contains the circuit-closing contacts. You can regulate these contacts by setting a dial. An electric bell, switch and two dry cells in an imitation-leather case complete the equipment.

Now, increase in temperature causes air to expand. If this increase occurs gradually, as happens during daily temperature changes, the air column in the tube will pass its increased pressure slowly through the capillary. Any rapid expansion, though, causes the diaphragm to move, too. This closes the circuit to the alarm and sounds the bell.

This system does everything you expect your alarm to do. Also, it requires no fuse links, which may fail, and needs no additional pressure on the lines. You don't have to keep checking this equipment to see that everything is in order. Merely lighting a match and applying its heat anywhere along the tube of the French device will tell you immediately if the alarm system is working.

Using the ¼-inch tubing needed in your setup and drilling holes in that tubing are costly. As for your pressure tank, it's a nuisance and you'll get nothing but a headache from fussing with it.

Your unit is much more costly than the French alarm but it won't work a bit better. Better than your idea or the French one is the old zigzag string method. It covers every foot of the area adequately (provided there are flames) and may double as a burglar alarm. Except for bell and batteries, the string system should cost less than 50 cents to set up—a big point in its favor during these days of fancy prices.

better umbrella

Richard S. Robsky of White Plains, New York, thinks it's time someone built a better umbrella and sends along a design of his own for modernizing our old-fashioned "portable roof against rain."

ANSWER: It's a nice idea but you still haven't built that better umbrella. You expect your umbrella to be light and easy to handle. Yet to swing the ribs into an extended position you have to apply a lot of tension. With the leverage you'll get from your umbrella, you must have stronger, and therefore heavier, parts to stand the strain. This will complicate the design and limit your umbrella strictly to strong men. Nobody else will be able to open it.

Why extend the knobs on the ribs? Most of the umbrellas that women use have small plastic tips but they are only ornaments. And what do you gain by an extending shaft? An umbrella-carrying man wants to use his umbrella as much like a cane as possible when the rain holds up. He gets the longer stick, with the cloth mounted so that it will come nearer to his hand. Most feminine umbrellas have very small extensions and the foldaway type has none at all.

Although we'd like to see a better umbrella, we think that these improvements should simplify, not complicate, the design. For a real improvement, develop a good 25-cent umbrella that you can use once or twice, then discard. To sell for 25 cents, the manufacturing cost should be only about a nickel. The Chinese have produced such cheap umbrellas by hand. Modern machinery might be able to do a better job for a cost comparable to that of the low-waged Chinese.

Make a working model before proceeding further. Be sure that the design is practical

[*Continued on page* 32]

INVENTORS

A patent is a valuable right. On the basis of a constitutional provision Congress has established a system under which inventors may secure the exclusive right to prevent the unauthorized use, manufacture and sale of their inventions for periods of seventeen years. The inventor secures this protection by obtaining a patent.

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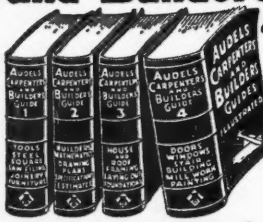

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Your Invention Clinic

[*Continued from page 28*]

before you make any attempt to get a patent.

● *collapsible globe*

Tim Samorodin of Kimberly, British Columbia, Canada, sends a design for a collapsible world globe. He also asks advice on a mechanized toy ball.

ANSWER: Your design for a collapsible globe is worthless. You cannot print the design with any degree of accuracy in the way you indicate. This globe also would need frequent attention. The cost of construction would be so much greater than for the globes now on the market and would outweigh the somewhat cheaper transportation costs of the collapsible globe.

On the other hand, we think that your "Dizzy Ball" is good. Try to build a working model and iron out all the kinks in the invention. Then check to see whether you can get a patent on your design.

While this item appears to be a modification of an old toy called "the Erratic Ball" and shown in 19th-century books, it's enough of a variation to justify a thorough investigation.

Follow this idea and simplify the design. Looks like a fine gadget.

● *pilotless planes—wing shaper*

Robert James of Galt, California, has shown his suggestion for television control of planes to some trusted engineers. The engineers think the ideas are good, he tells us. He also asks our opinion of an automatic wing shaper that he has designed.

ANSWER: Neither your suggestion for controlling pilotless planes nor your idea for an automatic wing shaper has been worked out enough to patent the designs or to justify experimental work.

Your automatic shaping of wing foils will cut away the wings toward the trailing edge and build up the wings at the leading edge until your final result will be almost a teardrop shape. Such an air foil would lose all value at high speeds and would be of little practical use even at fairly low speeds.

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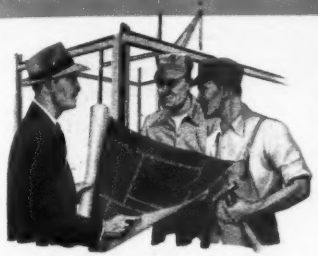

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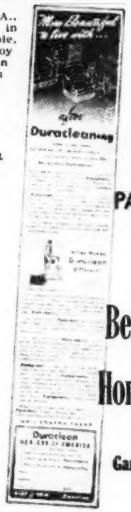

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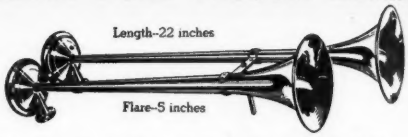

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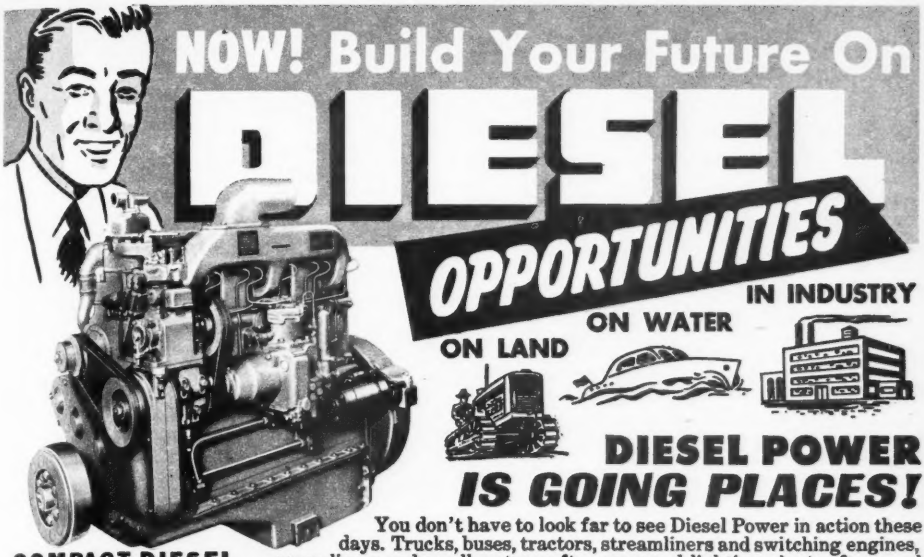

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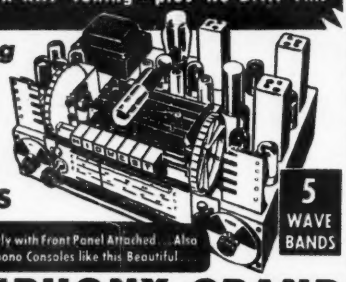

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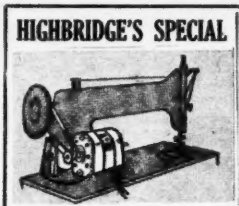

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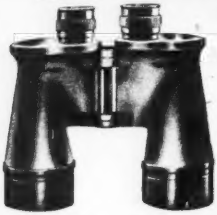

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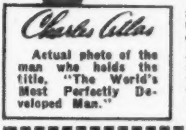

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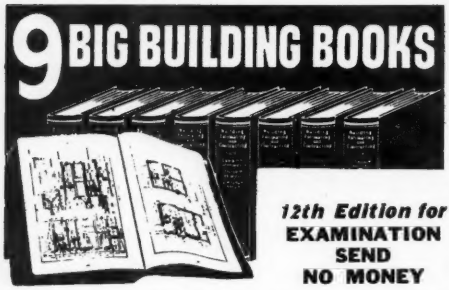

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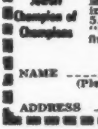

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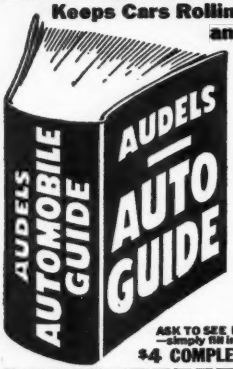

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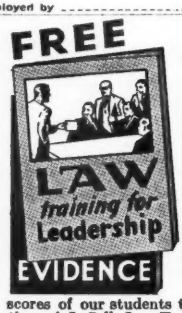

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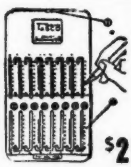

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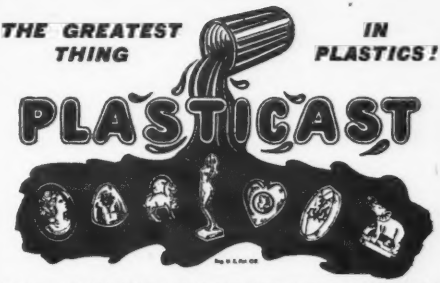

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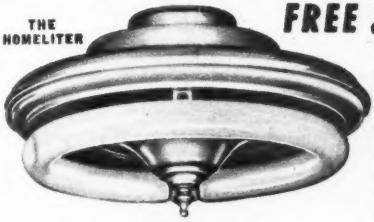

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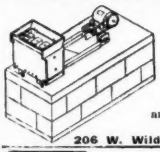

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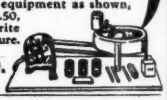

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WHEN you're hurt, you need the doctor quick. To rush first aid faster to stricken fliers, our new Air Force has teamed up volunteer medical men and survival specialists to leap to the rescue by parachute. Here a para-doctor, wearing a grill helmet to guard his face against tree tops, poises to jump. •

Seibel first built this model to prove his ideas.

Photos by Ross-Pix

He Built a

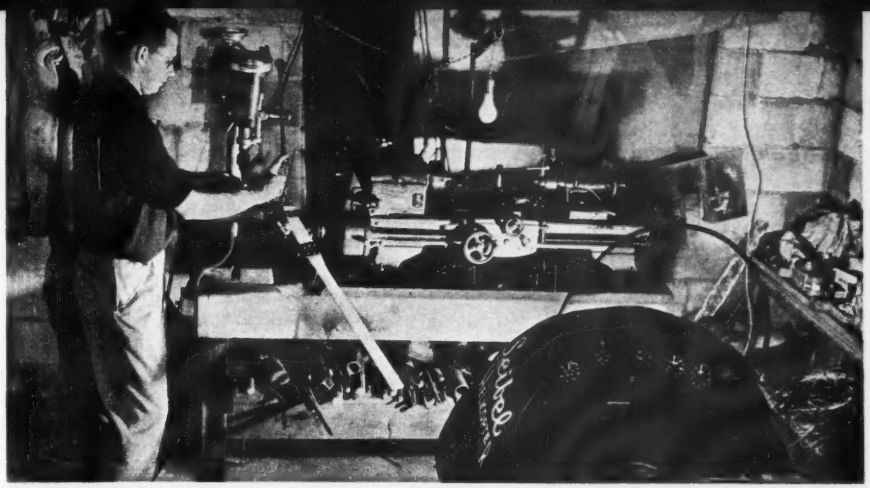
IN HIS CELLAR

WHEN Charles Seibel of Wichita, Kansas, broached his idea for a new-type helicopter, to an aircraft company, they laughed at him—said construction alone would take a quarter of a million bucks.

So he retired to his own cellar and started building. At the end of seven months he had an egg beater which flew easily and was cheap to operate and maintain. And it cost him less than $5,000.

Seibel used Ford truck gears and clutches, odd pieces of sheet metal, aluminum tubing, wood and wiring picked up at war surplus stockpiles.

When testing day came, he had no test-pilot so he flew it himself—successfully! And he had never flown a plane before in his life! •



CELLAR FACTORY: In this basement workshop Seibel built his "impossible" helicopter. It was made in 3 parts so it could be removed from the cellar without having to be dissembled. To start the 65-hp Franklin engine, below, he spins it with a cord like an outboard motor.

CONTROL: In his unique system the fuselage splits and moves backward or forward, changing the center of gravity of the ship and causing it to climb, lower left, or glide, lower right.

AIM: Dot Lind, Winchester .22 expert, gets ready as her husband prepares to throw clay targets.

World's Most Versatile Rifle:

It's accurate and powerful—can knock down a woodchuck and has been known to stop a grizzly!

By Lt. Col. Jim Crossman

THERE is nothing in the shooting game that will give you more fun for less money than the .22 rim fire rifle. It is by far the most popular rifle in this country —and justly so, as it can be cheap in cost and cheap to operate. It can also be amazingly accurate and effective on small game.

A quick glance at the gun catalogs will prove the popularity of this type rifle, as you will find over 40 different makes and types now on the market. Trying to choose a rifle from this appalling list is a rough proposition unless you have your mind made up. I'll try to give you a few pointers here to reduce some of the confusion.

Any .22 rifle is made up basically of four groups of parts: the barrel, the action, the stock, and the accessories. The rifling in the barrel spins the bullet when it is driven through so that the bullet will travel point first after it leaves the barrel. The hole in the barrel is enlarged slightly at the rear to hold the cartridge during firing.

The action of the rifle has several jobs and is the main point of distinction between the various types of rifles. Holding the cartridge in the chamber when it's fired is the most important job of the action. Contrary to what many people think, the action doesn't seal the rear of the barrel, but lets the cartridge act as a washer to hold the gas in place. As a concession to our craze for convenience, the action also feeds a cartridge into the chamber, extracts the empty case and throws it out of the rifle. Operating the action normally pulls back the hammer or firing pin against the main spring and latches it in place behind the trigger mechanism, ready to fire the cartridge when the trigger is pulled.

The action of the rifle can be operated in a number of ways, but the .22 field is limited to four types: bolt, slide or pump, lever,

FIRE: Eight direct hits in rapid succession—that's real shootin'! Husband is marksman, too.

the .22

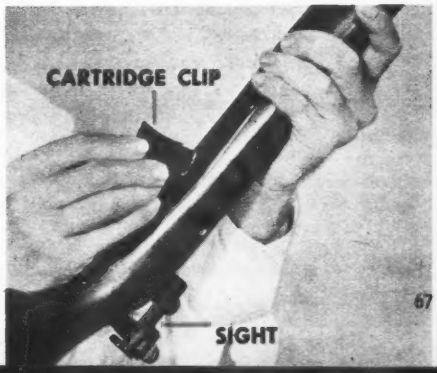
Bolt action rifle is popular. Model above is a single-shot; bolt is drawn back to load. Repeater, below, carries shells in clip.

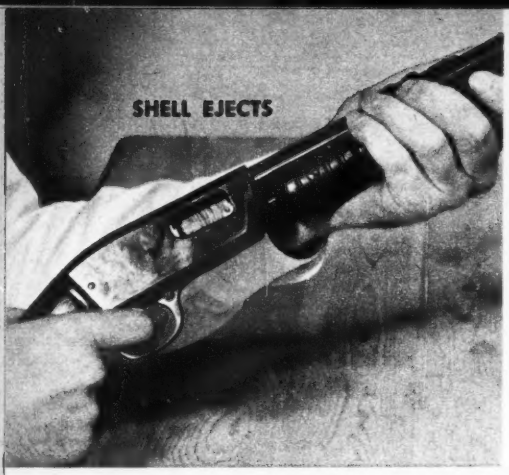
and semi-automatic. The bolt type works like the sliding bolts commonly used to hold doors closed. The bolt is a roughly tubular piece of steel with a handle fastened to it. The bolt is pulled back and forth to load and cock, and is rotated slightly by the handle to lock in firing position.

The slide or pump action has a wooden fore-end which you slide back and forth to operate the action, while the lever action type has a lever shaped to fit the fingers and to act as a trigger guard. The lever hinges ahead of the trigger and is swung down and back to reload.

The semi-automatic or self loader is the lazy man's gun, since the shooter only has to pull the trigger. Power to operate the action comes from the cartridge itself during firing, but this doesn't noticeably affect the range or power of the bullet.

The type of magazine is worth considering seriously, as it affects the usefulness and





Pump repeater ejects shell when pump handle is pulled back, loads when handle is pushed forward.

This type carries more shells than bolt action including short, long, long rifle. Tube holds them.

pleasure derived from the rifle. The simplest type, the single shot, doesn't have any magazine and you have the rifle by hand for each shot.

The box type magazine fits in the bottom of the rifle and holds the cartridges side by side, one on top of the other. Five or six shots is the usual capacity, although you occasionally see a longer 10 shot magazine, which sticks down below the rifle. This box magazine is detachable and if you have two, you can fill the empty while the full one is in the rifle—or better yet, get your shooting partner to fill it for you.

A long, slender tube extending forward under the barrel is the earmark of the tubular magazine, which carries the cartridges nose-to-base. It's filled by dropping cartridges in a hole in the tube, which is exposed when you pull the magazine follower partially out of the tube. The magazine itself is not detachable, but it has a greater capacity than the box type, varying from 20 to 30 shots and from 14 to 20 long rifle cartridges.

When you start assembling the types of actions and magazines, you find these combinations:

Type of Action	*Type of Magazine*
Bolt	Single shot, box, tubular
Slide	Tubular
Lever	Tubular
Semi-automatic	Box, tubular, stock

This variety is confused more by some of these types appearing in several makes and in several price ranges. A buyer in the .22 market must be very careful.

Picking a particular rifle out of this mess naturally depends on what you're going to use it for—and how much money you can sneak out of the household budget. Let's be silly and start by assuming we don't have to worry about money. If you have a shotgun or high power rifle and would like to use the .22 to keep in training, then get the type which has a similar action. If you have a slide-action shotgun or M141 Remington, then the Remington 121, Winchester 61 or Winchester 62 are good trainers. If you're partial to the lever action, then you'll be well pleased with the Marlin M39.

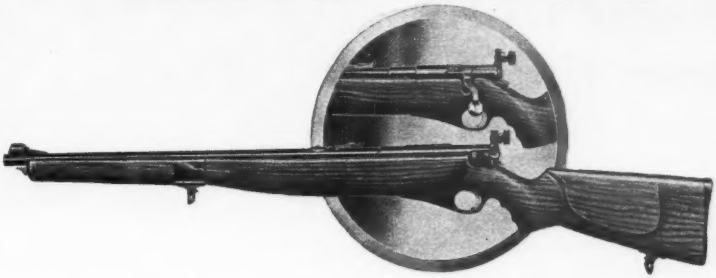
The cheaper rifles generally won't give you as many hits on long range small targets due to poorer accuracy, weight, and sights.

Starting with no preconceived ideas to pick a rifle for general miscellaneous shooting, my own choice would be the semi-automatic or slide action with tubular or stock magazine and with good sights or an inexpensive scope. The semi-automatic will handle only the one cartridge for which it is chambered—except the Remington 550. For this reason I lean toward a slide action to handle all three—short, long and long rifle. This type is light, fast and a heap of fun on picnics.

The bolt action rifles generally are the least expensive, though, and are highly popular. Any of them should give you a lot of useful amusement and you can't get badly stung in buying any of them. In comparative types, price is a rough guide to workmanship, finish and accessories. •

Semi-automatics have tube magazines, load through side as above, or end plate.

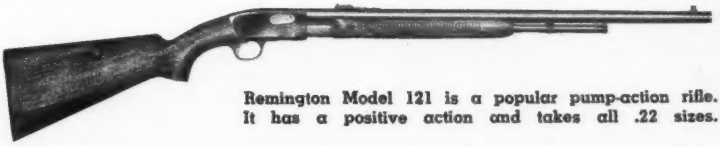
Telescope on a .22 increases its accuracy and distance, adjusts for range, wind.



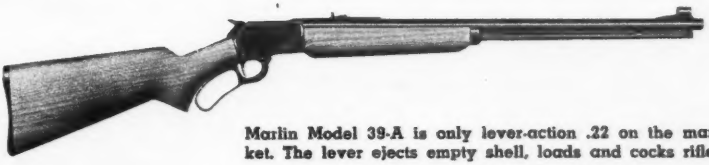
Mossberg Model 46M is a bolt-action type in military style with swivels for sling. Mirror view shows bolt on opposite side. It has stock cheekplate, rear peep sight.

Stevens Model 15 is cheap, reliable, single-shot rifle of bolt-action type. It shoots all size .22s.

Marlin 88-C is a semi-automatic with black walnut stock. Closeup shows new, simplified side ejection.



Remington Model 121 is a popular pump-action rifle. It has a positive action and takes all .22 sizes.



Marlin Model 39-A is only lever-action .22 on the market. The lever ejects empty shell, loads and cocks rifle.

THIS MONTH'S

prize gadget

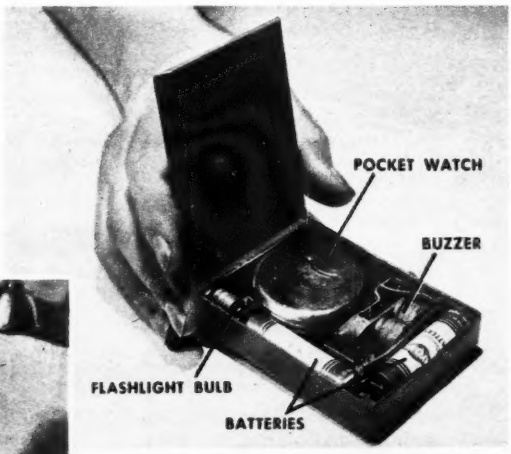
Under-Pillow Alarm Clock

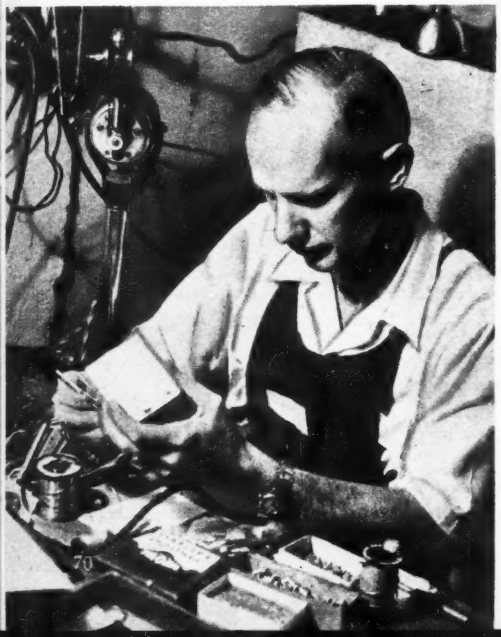
THE WINNER: An alarm clock that awakens only you, invented by Robert L. Whitman of 73 S.W. 8th Street, Miami.

THREE young men were sharing an apartment. One had to get up in the morning at 6, and one at 7 and the other at 8. But the 6 o'clock bachelor's alarm clock awakened the other two every day.

In desperation Robert L. Whitman, the 8 o'clock bachelor, decided something had to be done. He experimented and came up with a clock that fitted under the early bird's pillow and woke only him when the electric alarm rang. It could be used as a bedside flashlight, too.

Not only did Whitman win two extra hours of sleep, but also MI's $50 check for the month's prize gadget. •





Ordinary pocket watch and two dime-store batteries, above, operate the buzzer which rings for more than three minutes. Delicate workmanship by Whitman, left, makes clock a sure awakener.

YOU CAN WIN $50

Dreamed up a neat gadget? Send pictures and a description of your favorite invention to Gadget Editor, MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y. Each month the best entry, in the opinion of MI's editors, will be awarded a prize of $50.

Chop You a House, Mister?

"We do everything—from forest to finished product" is the slogan of two ex-GI's who build new houses in pioneer style.

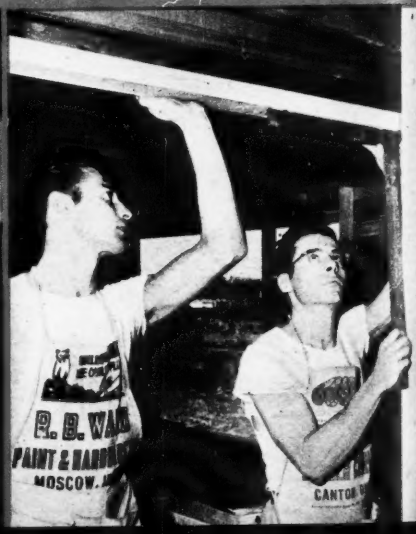
By Rafe Gibbs

WHEN great-grandfather and America were young, it was possible for a man to take an ax into the forest and produce a house in keeping with the times. Now house building has become more complicated —except for Lloyd Halverson, 22, and Roy Kahler, 21, of Moscow, Idaho. Starting from flat-broke scratch, they have set themselves up in a successful and unique house building business that has for its slogan, "We do everything—from forest to finished product." [*Continued on page* 73]

Timber! Kahler, left and Halverson demonstrate the first step in their home-building business.

Logs are turned into lumber in the sawmill built, owned and operated by the two partners, below.

Self-made carpenters, Lloyd, left, and Roy next convert their lumber into a bungalow's framework.



And the slogan doesn't exaggerate the facts. The very busy, very versatile two-man corporation of Halverson and Kahler goes out into the woods, cuts down trees, hauls the logs to town in the corporation truck, saws them up in the corporation sawmill, trims them in the corporation planing mill and nails down the finished product with corporation hammers to form a modern house. And the strangest part of this strange business is that a minimum of cash changes hands in the building process. Halverson and Kahler have borrowed another trick from great-grandfather. They barter.

The whole business is a combination of young American ingenuity and old Yankee swapping technique with a touch of Horatio Alger. It is a striking example of free enterprise right down to the tree roots. (An odd enterprise to be going on in a town called Moscow!)

It all started one Sunday afternoon last June when Halverson and Kahler lay stretched out on a pine-shaded lawn. They had just completed one year of study at the University of Idaho in Moscow under the GI bill of rights—Halverson in architecture and Kahler in business.

"You know," mused Halverson, "this town is like most other towns in the United States today. Needs more houses. We ought to build some. Make ourselves a healthy grubstake, then go back to college in style."

"Sounds good," agreed Kahler, "but it takes capital to get started in business."

Principal assets of the two consisted of a beaten-down pickup truck, for which Kahler had paid $100, and a more beaten-down coupe Halverson had bought for $90.

"Let's do some asset thawing," said Halverson, "and see how fast we can build up capital."

The "thawing" process involved the overhauling and painting of the assets. Much improved, the coupe sold for $350, the pick-up for $355. That gave the corporation $705.

"If," said Kahler, "we had a truck, we could make some fast money hauling hay with it, then use it in the house-building business."

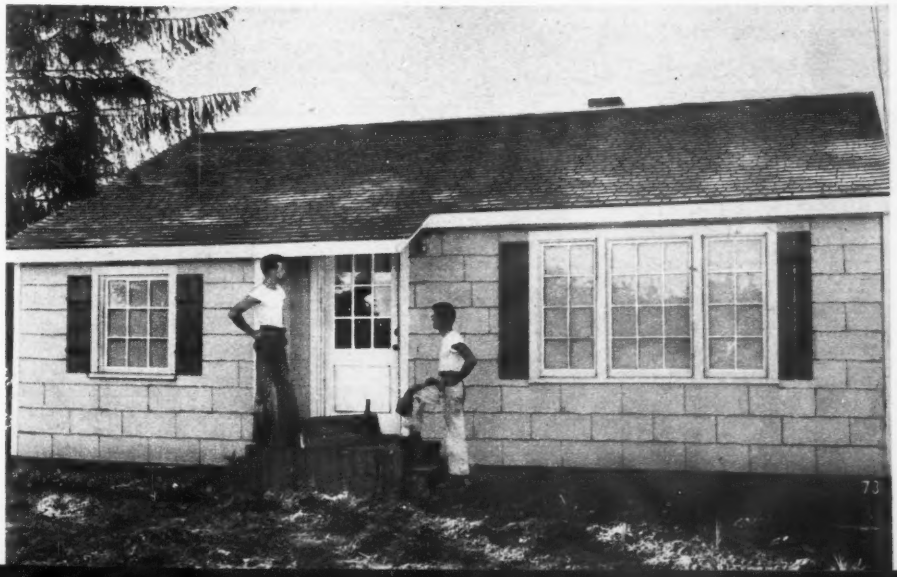
The corporation started looking for a suitable and cheap truck, found one weathering behind a farmer's barn. The owner wouldn't sell it but he *would* trade it for the hauling of some gravel. Hauling gravel with his truck, however, would be slow, difficult.

The corporation looked around some more, this time found a small dump truck, bought it for $500, then began hauling gravel like mad. Soon the corporation owned the hay-hauling truck it really wanted and took its first loss with a grin by selling the dump truck for $400. But in the face of this loss, it now had a bigger and better truck worth, when overhauled by the corporation, maybe $1,000.

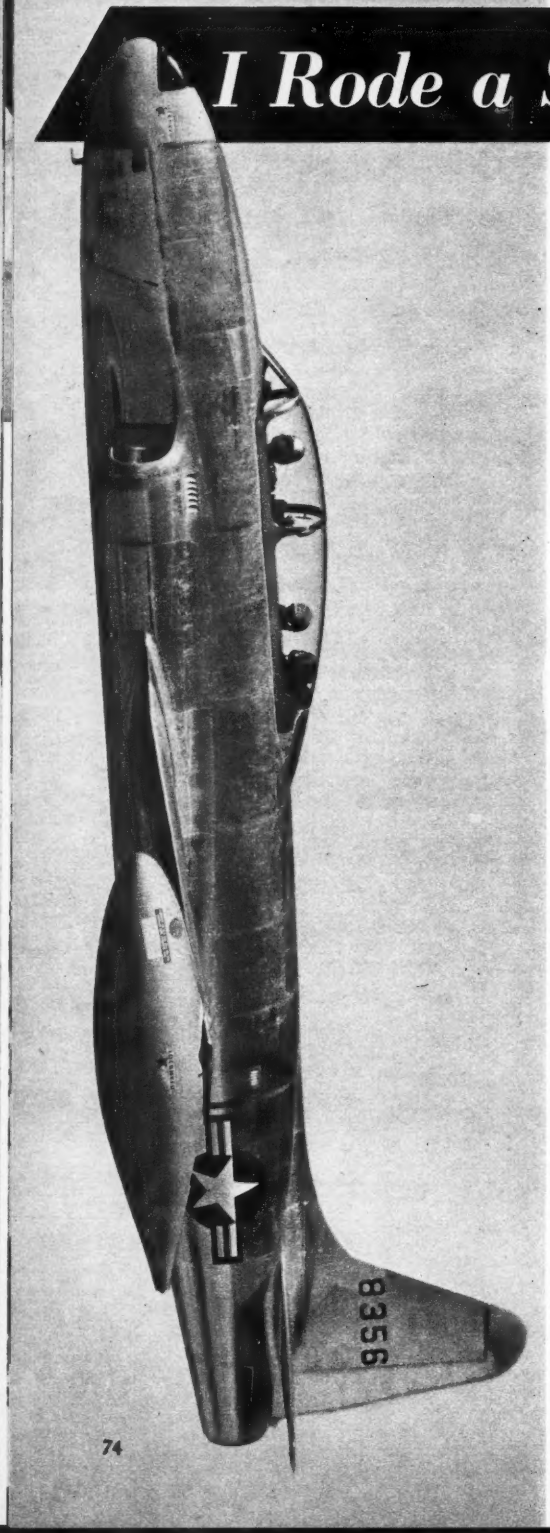
While the sun shone and sometimes while the moon did, too, Halverson and Kahler made hay, averaging $25 a day. Finally, the corporation had the capital needed for going into the house-building business—or so the youthful members thought.

They were [*Continued on page* 99]

And here the firm of Kahler-Halverson surveys their finished handiwork.



I Rode a Shooting Star



By George Scullin

THEIR pilots called them "spook boxes" and "ghost coops." At 45,000 feet, cruising along at 600 mph, they said you could hear voices and the sound of cellar doors slamming and chains rattling down dungeon stairs. Ghostly little hands clutched at their collars, these jet jockies reported, and sometimes right after a flight, they said their chests ached as if they had been beaten across the chest with a baseball bat. And many pilots told stories of cruising along in bright sunshine and suddenly experiencing a miniature snow storm inside the sealed cockpit!

The first jet pilots' tales of a ghost world that existed in the sky, somewhere between the speed of sound and the fourth dimension, launched fiction writers on a series of weird yarns that had Joe Public—you and me—wondering whether riding in one of these aerial flame throwers was like flying or like taking a trip to Mars. Thanks to the Army Air Force and the editors of MI, I am now in a position to tell you how it *does* feel to fly a jet.

But first a word of background.

Last winter Lockheed cut up the fuselage of an F-80 Shooting Star, added three and a half feet to its length and inserted an extra seat, complete with full set of instruments and flight controls. The object was not entirely to satisfy the curiosity of writers who wanted to ride as passenger-reporters. The Air Force wanted 156 dual-seaters to expedite its training program for jet pilots.

Tony Levier, Lockheed's 35-year-old Chief Engineering Test Pilot, took the elongated Shooting Star up for its first flight on March 22 and let it feel the wind over its air foils. When Tony came down, he knew he had added a new plane to America's air wing. The Air Force called it the FT-80C (Fighter Trainer-80C). If anything, it was a shade faster than the F-80.

On July 19, as MI's representative, I went to Andrews Air Force Base near Washington, D. C., to take a ride in this ship, along with a score of other correspondents from the country's top

Want to jockey a jet into the wide blue yonder? Here's how it feels to zoom along in the rumbleseat of a 600-mph spook box.

magazines and news services. We drew lots to determine the order in which we were to be taken aloft. I drew the second flight.

Before the hops got under way we were told a few things about the FT-80C and what we could expect to experience. We were shown four hooks that lock the seven-foot canopy in place against the terrific pull of suction, each hook designed to withstand 10,000 pounds. (The weight of the FT-80C empty is 8,084 pounds.) We learned that the cockpit is kept at a constant 70 degrees by *refrigeration*. The air to ventilate the cockpit is drawn from the compressed air of the engine, cooled in an expansion turbine, mixed with outside air pouring through the air ducts and released into the cockpit through six ports. At high speeds in humid air the sudden expansion of the compressed air would produce a fog on the floor of the plane, they told us, and in cases of extreme humidity it might even cause a slight snowfall. We asked a battery of the Air Force's most experienced jet pilots, men from the famed Fourth Fighter Group, about the "ghosts" fliers had reported hearing when the plane was in flight.

"Just the ordinary noises that go on in any plane," replied Lt. Col. W. V. Edwards. "The difference is that in a conventional plane, the roar of motor and propeller drowns out the sounds of booster pumps, inverters, dynamos and even the wind. But in jet-propelled craft the roar of the motor is left far behind and the other noises are then audible. We're used to them now."

And what happens to the men physically? The pains in the chest and all that? The answer from varied sources is that as yet no one has suffered any harmful effects but the doctors are still working on the problem of temporary discomfort. For awhile the 4th Fighter Wing flew laboratory rats around with them so that the MD's could observe the effects on the rodents of high altitude and high speed flight. The rats thrived.

As for the pains in the chest, they came from unused muscles suddenly called upon to go to work. At 45,000 feet, the oxygen masks force air into the lungs under pressure to assure an adequate supply. To exhale, the pilot is compelled to compress his chest to force the air out against the pressure. After a couple of hours of

Wh-o-o-sh is the word for that out-of-the-world feeling you get when the jet tries to escape gravity.

this abnormal exhalation, chest muscles are apt to ache worse than a spring pitcher's sore arm. Nothing serious, though.

After the briefing a bus took us to a ramp at the far edge of the field where the TF-80C was waiting for us. The plane, with its 38-foot wing span and 37-foot fuselage, seemed no bigger than a light plane. But with its slim fuselage tapering down to a pail-sized tail pipe, it was the first aircraft I had ever seen that looked like it was going 600 mph while standing still.

Captain David Olds took me over to the operations shack where I was outfitted with crash helmet, earphones and lip mike. The lip mike, a little square button that straps over the upper lip, is the latest gadget of the Air Force to improve communication in the cockpit. It is far more comfortable than the old throat mike.

A Lockheed technical man strapped me into my chute. Then he strapped me into my seat. Then he plugged in my earphones and lip mike. I could still move my arms and legs and turn my head but otherwise I was a part of the plane. The canopy was drawn down by an electric hoist and the four clamps were locked fast.

Taxiing out to the runway was simple enough but I couldn't escape the eerie feeling that we were being pushed from beneath by a little man in a jeep. I still could not believe that the searing hot air from the tail pipe was pushing us. It seemed that it was just the exhaust of some great and invisible motor that must be around if I only knew where to look.

Tony Levier, who piloted the plane on these flights too, called the field tower for take-off clearance and for a few seconds I was back in the real world, listening to the familiar exchange of instructions between pilot and tower.

We were cleared to take off.

"I'll take it easy," Tony said to me over the inter-phone. "I'll call off our speed on the take-off run. Once off the ground and the wheels up, I'll climb at 170 mph."

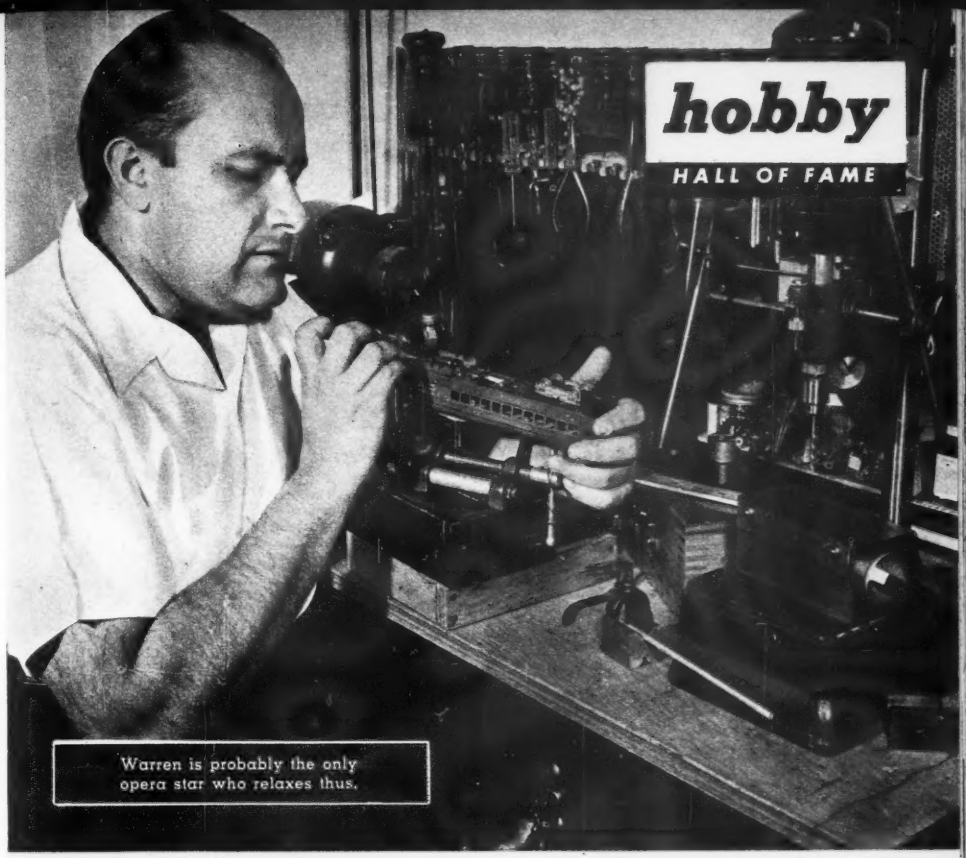
That strange power I couldn't fathom took hold again and my back felt a gentle, insistent push. The real world was not gone yet. From the corners of my eyes I could see the edges of the runway and a distant border of trees. The cockpit was strangely quiet but I could feel the wheels vibrating upon solid runway.

There were forces tugging at the wings. The trees were now a blur. We were accelerating at a rate such as I had never encountered before.

Tony's voice came over the inter-phone, calling off the air speed. "One hundred and ten . . . one hundred twenty . . . one thirty . . . forty. . . ." The needle was climbing so fast he couldn't keep up with it. The horizon, clear in the center, blurred at the edges, whipped below us and we were up. A faint thud and a warning light turning to red indicated the wheels were tucked away.

The air-speed indicator showed 170 mph during the climb. That was a comfortable speed [*Continued on page* 98]

Lots of room for two in the "ghost coop." The seven-foot canopy over cockpits is electrically operated.



Warren is probably the only opera star who relaxes thus.

Leonard Warren—Opera Star

SINGING stellar roles on the vast stage of the celebrated Metropolitan Opera House and building miniature railroads in a tiny workshop in a New York City apartment are activities which are not so unrelated as you might suppose. At any rate, not in the case of the Met's well-known baritone Leonard Warren, who took up model-train building on doctor's orders, to overcome nervous exhaustion incurred during his trying operatic performances and concert singing.

In his small but well equipped shop the singer has constructed 35 freight cars, six engines and a complete track layout, operated from a control board which he made.

Hobbyist Warren doesn't spend much time running his trains, though. Says its more fun just making them. •

His role of Amonasro in "Aida" is one of dozens he has sung.

THE enemy struck the first blow without warning. One-way suicide bombers still are streaking across the dark sky, rocking our big cities, ripping up our key airfields, smashing at our atomic arsenals. Some of our planes try to hit back at the enemy but vanish in a terrific blast before they can clear the shattered runways.

But far from the flaming cities and the exploding planes there's a strange bustling of dimmed-out trucks and military cars around a rolling farm field. Suddenly the ground at the foot of that isolated field opens up. A huge airship emerges slowly from the earth, then shoots aloft into the night.

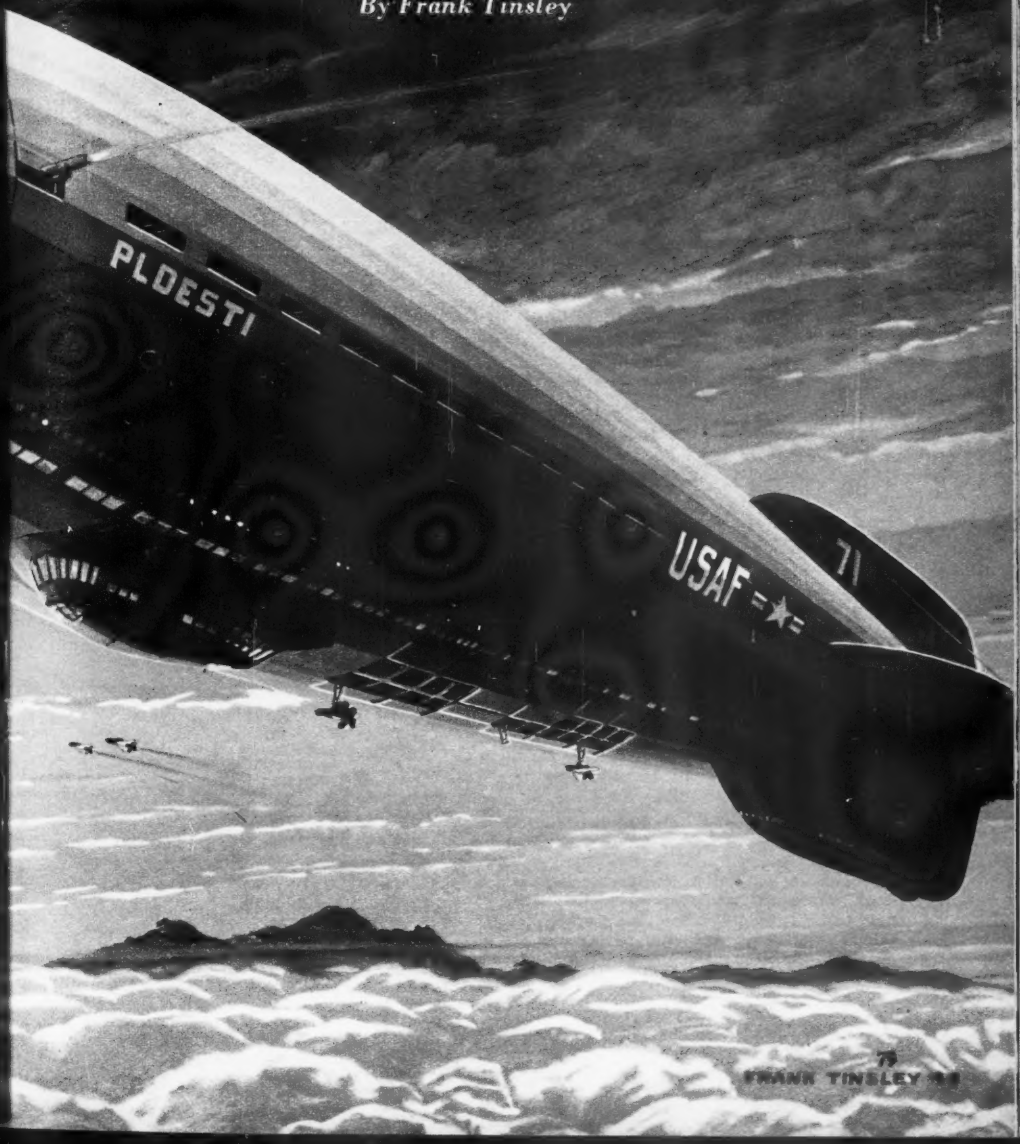
The Ploesti, one of America's new jet dirigibles named for famous air strikes of World War II, whizzes off to join the other giant airships slipping out of their secret hangars buried in the farmlands around Lakehurst, N. J. On the west coast another mighty fleet of jet airships also arms its long-range missiles with atomic warheads and bursts forth from other underground shelters hidden in the California countryside. The two lighter-than-air armadas fan out through the night and steal toward the enemy's home bases.

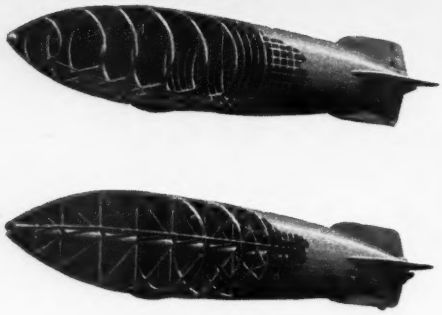
All during the night the Ploesti zooms through black layers of cloud. Now and then her tiny brood of night fighters buzz close under the great ship's belly. The parasite planes hook on briefly to the mother ship for refueling, then drop off again to resume their fighter patrol.

Is This America's Secret Weapon?

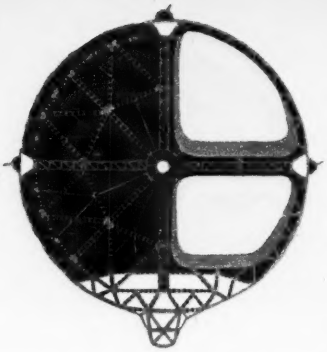
Giant jet airships launching atomic missiles deep into the enemy's heart may be our "ace-in-the-hole" if war comes.

By Frank Tinsley

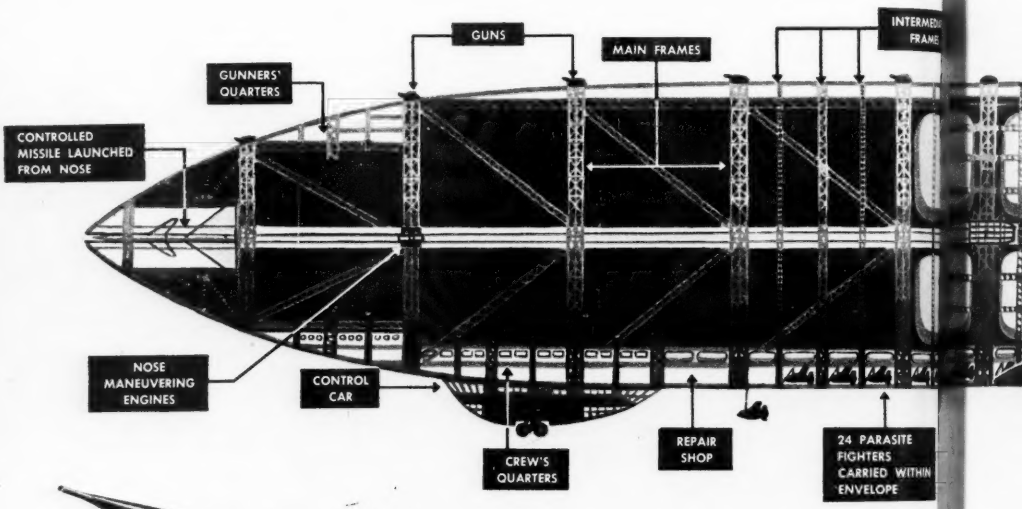


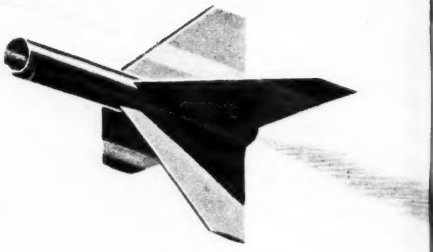


These cutaway drawings reveal the jet airship's sturdy magnesium structure and fishlike skeleton.



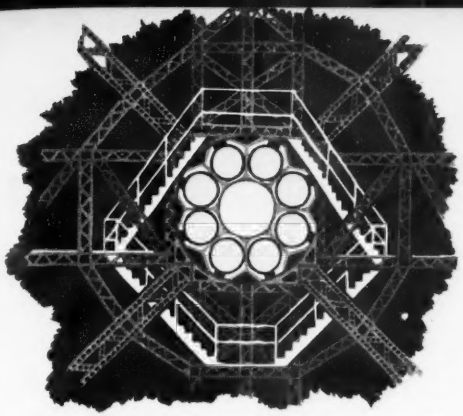
Head-on structural view shows how guns and gas cells are mounted securely in the big dirigible.



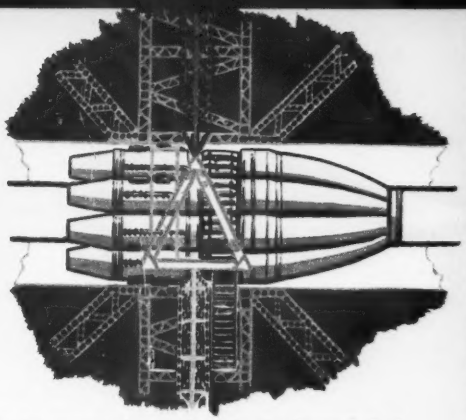


The atomic warhead, powered by twin ramjets on the wingtips, speeds on to smash the target as the rocket launcher falls away. The launcher serves as a self-starter for the ramjets, which don't "warm up" until they are tearing along at near-sonic speeds. When this rocket booster exhausts its liquid fuel after a few seconds of dazzling, flame-streaked flight, the launcher automatically detaches itself from the missile.

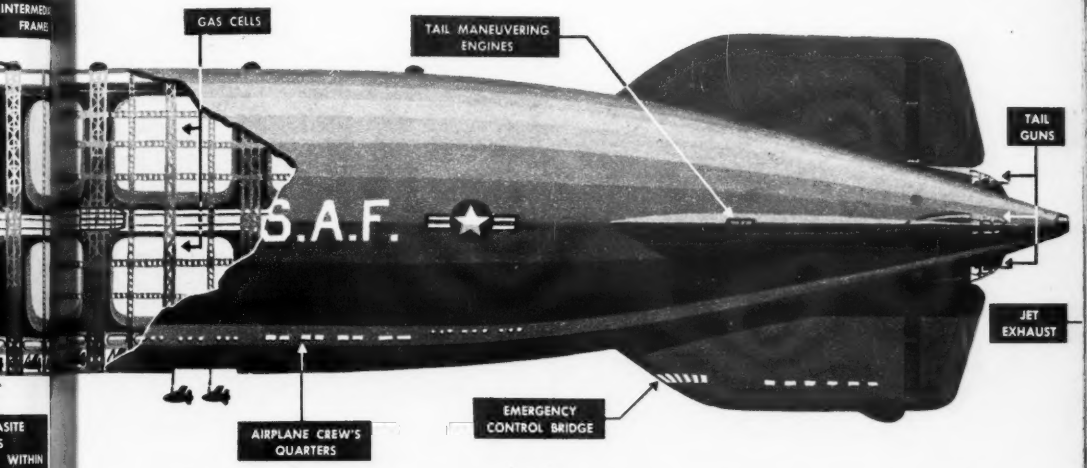
FRANK TINSLEY '48



Big tailpipes fire powerful thrusts from the jet engines to drive the ship forward at high speed.



The jet power plant is built in the "marrow" of the backbone running through the ship's center.



At dawn the Ploesti and the other airships in her fleet are spread out hundreds of miles off the enemy's shore. The Ploesti's skipper glances at the red dot pencilled on the target chart before him, then pulls a lever on the control board. The ship swerves and shudders as the steering propjets swing out of their wells and spin the ship into firing position.

The missile crew at the firing station in the nose arms the warhead and stands by for the flash from the skipper. The fighter escort opens out in a wide funnel before the airship's missile-loaded bow. Quickly the skipper double-checks each department. All clear.

Tensely the skipper jockeys the propjets and steadies the ship's great guided-missile gun on its invisible target deep in the enemy's heartland. The red fingers on the aiming dial now quiver directly under the cross hairs. The skipper jabs his thumb against the firing button. The ship staggers with shock and pitches the captain hard against the target chart.

The Ploesti's nose gleams scarlet as the flaming launcher drives the missile clear of the bow tube. Thunder of the powerful rocket engine stuns the firing crew as the missile hurtles over the horizon like a dazzling comet.

The captain braces himself after that first shock, then quickly fires missile after missile until his full atomic load has been "dumped" at the target. As he starts to speed the ship [*Continued on page* 148]

Convertible for a King

Meet Frank Kurtis, the power behind the wheels of America's hottest hot rods. He's creating our first sports car in 10 years.

Here's Kurtis enjoying his dreamboat that nearly stampeded the boys at Indianapolis.

By Tom McCahill

BIGGEST sensation at the Indianapolis Speedway this year wasn't a racer ripping around the track but a convertible gliding into the parking lot. Owners of America's hottest cars, who had driven hundreds of miles to see the auto classic, forgot about racing and crowded close to gape at that dream chariot.

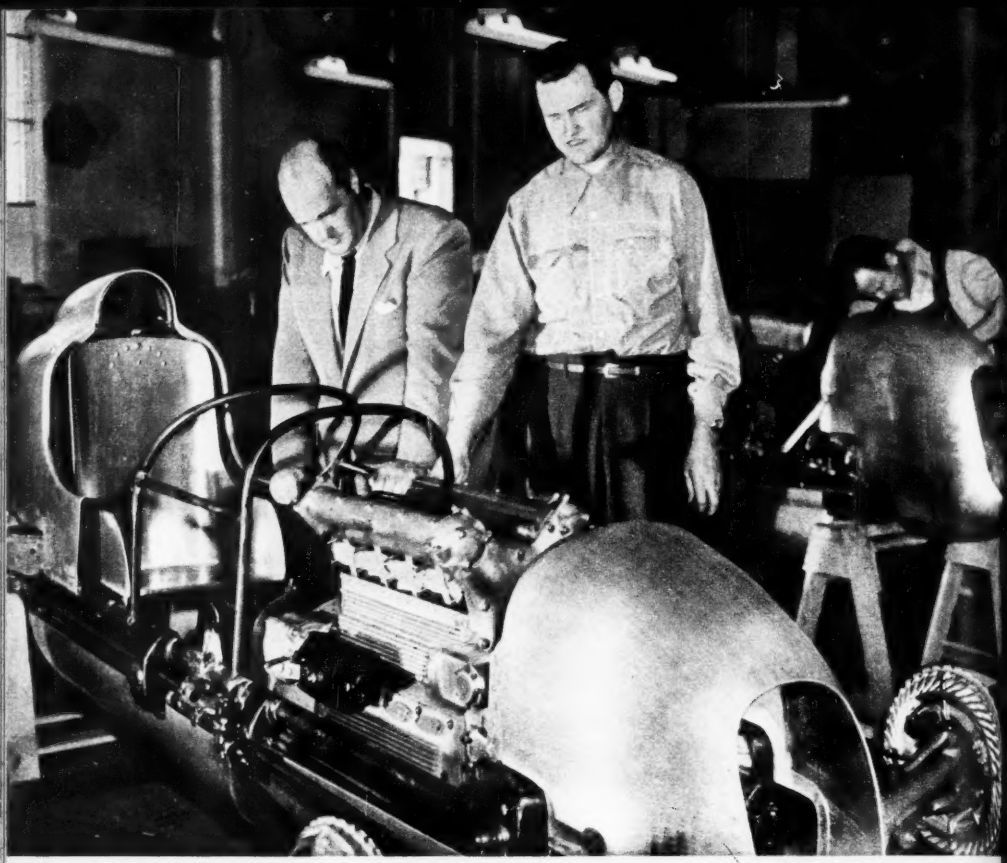
"What kind of a foreign job is it?" everybody wanted to know.

That's no imported caviar, brother—that's right out of our own backyard. Basically, the car that upset the custom-built boys at Indianapolis and that you see on these pages and on the cover is a 1941 Buick Roadmaster. Frank Kurtis, the thirty-nine-year-old king of the racing-car makers, found the Buick almost a total wreck before the war. He picked it up for a few dollars and had it hauled off to a corner of his racer factory at Glendale, Calif., where the wreck remained untouched for seven years.

This spring Frank decided he wanted something different for his annual drive east to the races. He remembered the Buick wreck and started rebuilding it to suit his fancy. I saw this job under construction at the factory a few weeks before the races, and the magic he worked on that scrap heap was terrific.

First, he stripped off the body and replaced the twisted frame with a new design of his own. This was a

Frank leans against the canvas-covered aluminum top, another innovation in his new convertible.



Kurtis shows McCahill how the Indianapolis racers are turned out on the production line at Glendale.

hand-made frame of steel covered and shaped with an aluminum skin. Then he rebuilt the engine with special Winfield high-speed cams, manifolds and accessories. Since one of the biggest worries when you try to hop up a conventional motor is overheating, Frank doubled the radiator core to keep his hot rod from burning up. After jiving up the power plant, he polished off the whole thing with bright chrome plating that made everything under the hood shine up like a fresh-minted silver dollar. For fast driving, he reduced the tire size from the conventional Buick 7.00x15 to 6.70x15.

The most remarkable feature of Frank's fancy job, though, is his all-aluminum convertible top which he covered with regular auto canvas. This metal top folds at three points, then slides smoothly down into the well behind the rear seat. So, by his unique combination of metal and canvas Frank not only gave his convertible the snappy look of a perfect sport car but all the rigid protection of a turret top.

As for the way Frank's "renovated" Buick actually holds up on the road, Frank told me, "I cruised it for hours at 120 mph across the prairies and it didn't even get lukewarm."

That car made every other hot-rod that visited the track look like a lot of unmade Murphy beds. The chariot Frank Kurtis dreamed up when he resurrected that Buick wreck has everything—speed, safety, luxury, and class—dazzling class in every slick line. Truly, a convertible for a king!

Unless you're a real gone guy on the races, you probably never heard of this man Kurtis before. But to the racing fraternity the Kurtis who built that convertible is the uncrowned king of hot-rod heaven. From the Pacific to the Polo Grounds Kurtis cars hold nearly every important speed record, including the fastest time ever clocked at Indianapolis. On June 20 Kurtis's own car, piloted by

Walt Brown won the Triple-A national 100-mile Championship at Langhorn, Pa. Ninety-seven per cent of America's midget winners in 1947 and more than 50 per cent of the postwar big car racers are Kurtis jobs. Of the 11 cars Kurtis built for the Indianapolis race this year all but one qualified.

Since the war Frank has built more than 500 midgets and 30 Indianapolis cars in his two Glendale plants. If you have dough to burn on a fancy hot rod, Frank will build you a car from his own design or from somebody else's. Like Jimmy Melton, the Metropolitan Opera's Hot-Rod Kid, who was one of the multitude fascinated by the Kurtis convertible at Indianapolis and [*Continued on page* 99]

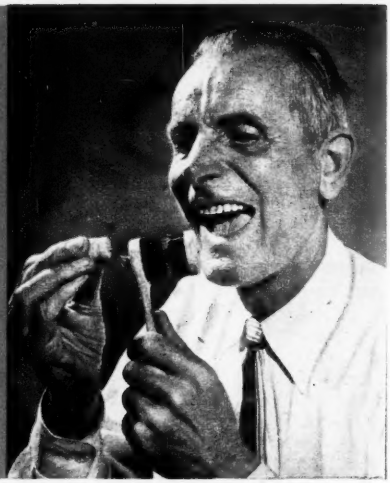
Frank gives his driver a final briefing before his racer lines up for the big speedway classic.

This is the same racer McCahill, on the opposite page, saw being built only a few weeks before the race.

A MONEY-MAKING

idea

My Workshop Can Make You A Million



Inventor Olsen demonstrates his inside-outside toothbrush.

Gadgets from the "House of Inventions."

1. Coat hanger holds two pairs of pants.
2. Individual coffee-grinding machine.
3. Kitty will purr when she is squeezed.
4. For household cats —this feline toilet.
5. Electric can opener saves kitchen labor.
6. External cigarette case for handbag.
7. Nipple for drinking beer from the can.
8. Screw driver punches insertion hole.
9. Cake cutter serves push-button portion.
10. Soap holder also is a washboard.
11. Lazy golfers love this golf-ball pickup.
12. Specially-shaped jar for storing false teeth.
13. Dish holds tea bags.
14. Rubber teething spoon.
15. Wire cigarette holder.
16. Salt and pepper shaker.

By William Olsen

Hobby Workshop owner

"HOW much do I owe you, sir?"

The kid held tightly to the jet plane model I had just helped him build in my workshop. I knew his wallet was as thin as one of the wood shavings on the floor.

"When you make your first million," I said, "come back and we'll talk about it."

And who knows, maybe that first million really will get its start in my hobby workshop!

You see, I run an odd kind of business. Officially, I call it the "House of Inventions." It takes up a four story building at 631 Third Ave., New York City. Unofficially, however, it's a workshop, meeting place and idea forum for what often seems like half the gadgeteers and inventors in the city. I guess thousands of people know it as "Olsen's Hobby Workshop."

There's space and facilities for all types of hobbies that require tools. I get a steady rental income from inventors who pay me to use my equipment for tinkering on their ideas. All kinds of people rent space and tools to work on anything from a new "antique" cabinet to a permanent sardine can opener.

With my benches, tools, drawing boards and reference books I also work out my own ideas; to date I've patented more than 200 of them. And I've helped other people with thousands of their ideas, some of which have brought us a solid cash return. You might say I've developed puttering into a money-making pastime. As a result, anything may turn up in my shop.

Take the time one of the neighborhood kids brought in a pair of old wheels he'd found in his garage. He wanted to clean them up and use them on a coaster. When they were all spruced up and the mud and rust scraped off them, I realized they were valuable antiques. Instead of wasting them on a coaster, we made them into a pair of chandeliers and eventually sold them for $140.

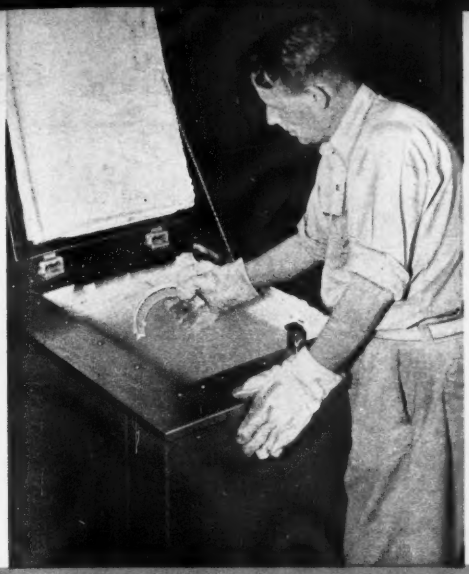
People have watched my hobby workshop in action. They've seen me making money and having a whale of a good time and said, "Bill, it's a good idea all right and I'd like to [*Continued on page* 144]

Throw your oars away when Olsen's hand-operated outboard hits the market.

Hobbyist Al Feltschauer works on his mechanical cow at a workbench in the "House of Inventions."

Industry Puts on the Freeze

Icicles form as parka-clad Westinghouse engineer gives oil circuit-breaker a high voltage test under arctic conditions.



Industrial Chilling machine hardens this metal brake shoe as it reaches 150 degrees F. below zero.

No firemen needed here! New dry-ice fire extinguisher quells flames in a few seconds.

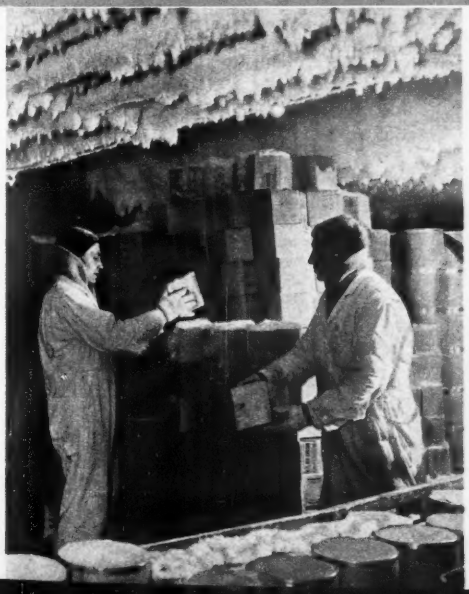
COLD is getting a very warm reception from industrial engineers these days. Cold—real shivery cold all the way down to 150 degrees F. below zero and even lower—is being put to work. It's doing jobs that heat used to do and doing them better.

By Eugene W. Nelson

During the past few years, American industry has brought forth mechanical chilling apparatus which can reach temperatures down to 150 degrees below zero. These mechanical chillers will do practically everything that dry ice can do and in addition, speed up production and improve the quality of certain products.

For instance, during the war one plant found itself manufacturing armor-piercing shells. These steel projectiles had to be heated in ovens and then cooled rapidly in cold water. That's how they were hardened so that they could [*Continued on page* 100]

It's hot outside but these storage room employes can't tell as they work at 21 degrees below zero.



Auto company knows how this car reacts in icy weather after two weeks in "Cold Room."

MI Tests the Futuramic Oldsmobile

By Tom McCahill

YOU'LL get a bang when you take a gander at the Futuramic, top model in the 1948 Oldsmobile line. It's a sleek, rakish job—the smartest looking car ever to roll out of General Motors and a long whistle ahead of some of its shoebox-on-wheels rivals.

You won't get a bang, though, when you hop in the Futuramic and step on the gas. Instead of a fast swish, it's just a slow squish when you press your foot down on the accelerator—like stepping on a wet sponge.

The Futuramic is a big car. It weighs about 3800 pounds but has only 115 horsepower in its straight-eight engine. Now 3800 pounds is a lot of weight to shove around with a 115-hp motor. When you couple that lack of power with the Hydra-Matic Drive (or automatic transmission, an original Oldsmobile feature), you seem to creep down the road instead of catapulting into high when you open the throttle. Of course, some drivers swear by Hydra-Matic instead of swearing at it. Personally I like a fast getaway, not the slow-fizzling start I got when I gave the Futuramic the gun.

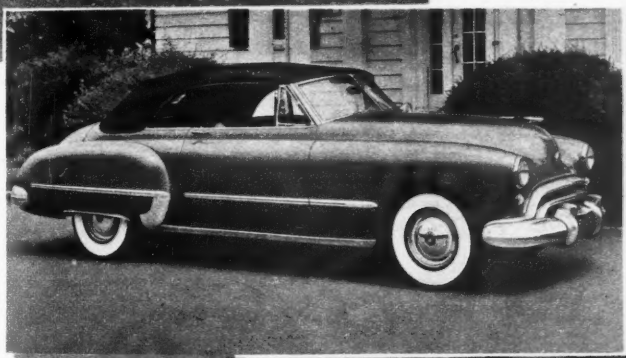
I ran the Futuramic through all gears except the low low, which is strictly a cel-

McCahill tries the Futuramic's wide-opening door before road-testing the slick new sedan.

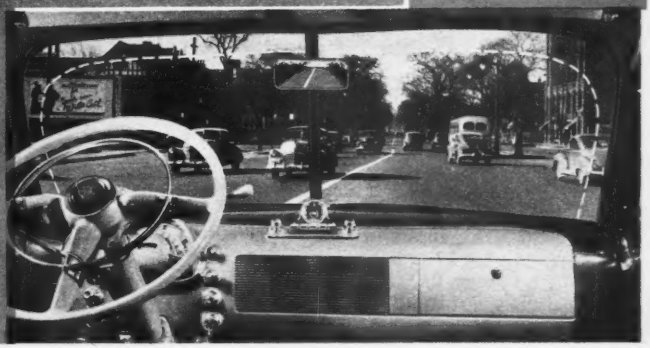
lar job for climbing walls or pulling out of a mudhole. I got the car going but there was nothing breezy about that start. After I got up to 10 mph, it took 18 seconds to reach 60 in third gear. In this Hydra-Matic job the third and fourth gears are the same as the conventional second and third, since the cellar gear, or low, is carried only for emergencies. In fourth gear (the conventional high) I rolled from 20 mph to 60 in 22 seconds. Oldsmobile engineers claim the car will hit 90 but I had neither the timing devices nor a suitable stretch of road to test the maximum speed.

Back in 1946 I tested the Oldsmobile "76," the postwar model, for MI. The Futuramic of 1948 is made only on the large series "98" chassis but it's basically the same machine I drove two years ago.

The really new feature is the body —and that does show superb craftsmanship. The windows on the de luxe model are extra big and give wonderful visibility. The doors open very wide and make it easy for plump Aunt Hatty or old Uncle Bill to climb aboard. [*Continued on page* 100]



Smooth styling and push-button top and windows mark this convertible version of the Futuramic.



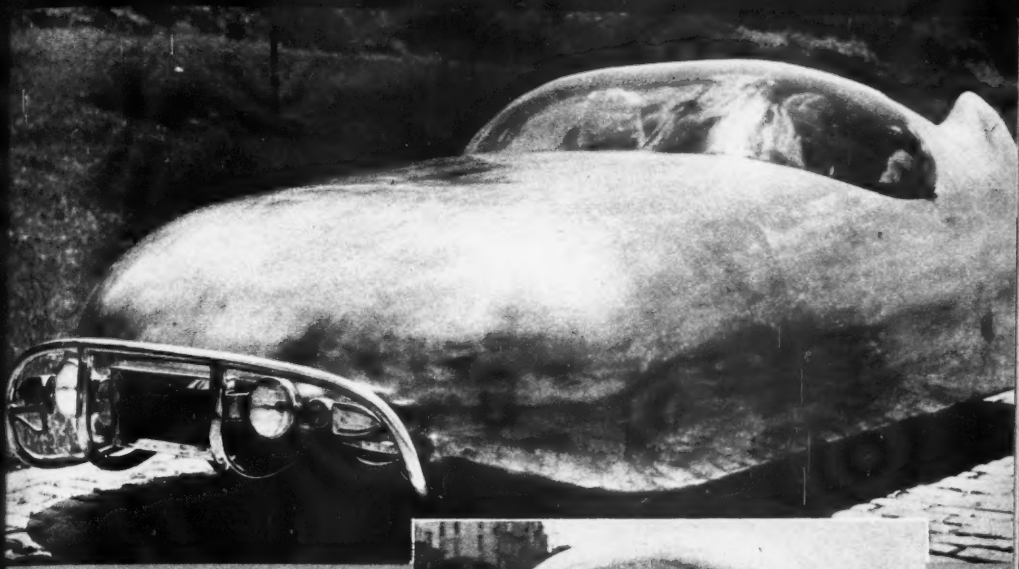
Here's the sweeping view you get through the Futuramic's expanded windshield.

NEW on the ROAD

Streamlined Cycle, left, is the only vehicle of this type to use standard auto hydraulic brakes. It has an air-cooled 6.7-hp engine and an extended body which acts as a bumper. Lowther Mfg. Co., Joliet, Ill., makes it.

Insect Screener, right, keeps bugs from lodging in your car radiator. A bristle brush, operated from glove compartment, sweeps away the insects. Made by J. W. Speaker Corp., Milwaukee, Wis.

Pee-Wee Motor Bus makes 100 miles on one gallon of gasoline. This one-hp coach is one of eight scale models, two feet high and eight feet long, built in England by former bus driver Ernest Johnstone. It'll carry a passenger, too.

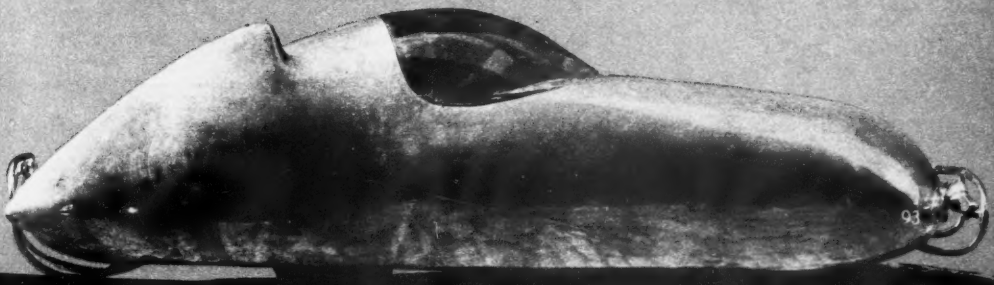


Metal Beetle: Here's a $15,000 hot rod that has pedestrians gaping in New York City. It's an aluminum-Plexiglas job designed and built by Russ Case, RCA-Victor exec. The chassis was made from a Navy jeep and the car has a revamped transmission which allows for four-wheel drive, rear two-wheel drive or front two-wheel drive.

It can hit 100 mph and makes about 20 miles per gallon. One weak point: the whole body has to be lifted almost vertically in order to climb in or out.

Up she goes! Special hydraulic system lifts body of car so designer Case can get out, above. Left, dashboard and steering wheel resemble airplane controls.

Photos on this page by Robert Brightman



NEW for the FARM

Versatile Tractor made by Ford's British factory, has various implements designed especially for use on the farm with the machine.

Above left, a Compton manure-loader is attached to the Fordson tractor. It does the work of six farm hands, loading a twelve-by-six-foot trailer in eight minutes.

Above right, a tool bar is mounted on the front of the tractor. It splits back the ridges and covers the potatoes after planting. Next attachment will probably be a gadget that fries the spuds as they're dug up.

Left, an agricultural drainage implement saves farmers from "ditch-digger's back." The fixed-arm rotor cutter digs a trench 30 inches deep by 15 inches wide at the top. Its maximum cutting speed is seven feet per minute.

The tractors are being manufactured by the Ford Motor Company, Ltd., Dagenham, Essex, England, with an eye on the U. S. market.

Heavy-Duty Loader looks complicated but is simple. Just drive tractor under the frame, fasten six bolts and you have a power shovel, crane or hoist by changing attachments.

Power Sprayer, below, is not only mobile but adaptable. Here used for whitewashing, it also serves to spray and disinfect. Made by Bean Manufacturing Co., Lansing, Mich.

Farm Handy Andy can replace a hired man. Primary unit is an arbor to which attachments can be fitted. Serves for grinder (above), saw table and circular saw (right). Yetter Mfg. Co., Colchester, Ill., makes it.

School For 'Gator Grapplers

1 Brave girls at Silver Springs, Fla., are learning a new sport—gator grappling. Hazel Day shows off the reptiles as the class enters the pit.

2 The gator girls dive into the crystal pool, then race across the sandy bottom like real mermaids to see who can grab that six-foot monster first.

3 It's all Hazel's at the finish—but how can she seize the 'gator before he turns and seizes her?

4 The alligator lashes its powerful tail viciously as Hazel calmly tightens her grip on its throat.

Globe photos of Ross Allen Reptile Institute

5 Hazel hangs on grimly and seeks to muzzle those dangerous jaws as the girl and 'gator spin wildly.

6 Hazel's got him now, girls, but watch that 'gator's tail.

7 Victory wink of a Graduate 'Gator Grappler.

I Rode a Shooting Star

[*Continued from page* 76]

and one with which I was familiar. But we were climbing almost *straight up!*

The silence was almost appalling.

Seconds later we were at 10,000 feet and Tony levelled off. The air speed indicator spun around and came to rest at 450 mph. There was no particular sense of speed. It was as if Tony had taken a thumb screw and set the air speed to 450 with his fingers without affecting the speed of the plane at all. Ahead I could see a small river. So gently were we suspended in the air that I had time to see the boats on its surface and some specks that were cows in an adjacent pasture. Then suddenly the river and the cows got out of there and jumped in back of me and ahead of us was mountainous forest that had moved in out of nowhere. I just had time to see it when it, too, vanished and we were skimming over farming country. The silence was almost appalling.

Tony was feeling me out. He was not concerned about what his plane would do but he *was* concerned about what his passengers might do. It was something new, having non-technical men in his baby, and he was testing them as carefully as he would test anything else new added to his plane.

"How many G's do you want to take?" he asked.

At briefing we had been told we would not black out until we were pulling eight G's or more (centrifugal force pressing us into our seats at eight times our own weight or more) so I figured I could handle a compromise of four G's without disgracing myself.

Tony nodded and the air speed crept up to 520 miles an hour. He rolled into a vertical bank and pulled the plane in until my hands, pressed upon my knees, felt weighted with lead. "That about it?" he asked.

I said it would do for now and Tony slid out of the bank and rolled over on the other side. He began playing with the air and a strange thing happened to me. I lost my sense of gravity. My sense of equilibrium was as good if not better than ever before but my contact with the earth was gone.

I have spent many hours horsing around alone in the air, trying to escape the tenacious pull of the earth. Sometimes, swooping up out of a loop, I almost made it but then the plane would slow down, the wings would vibrate before an approaching stall and the old earth would be pulling at me again. At those times I had felt that if only I could get a few more hundred miles per hour out of the plane, I could escape that sticky pull of gravity.

Well, the jet *has* those extra hundreds of miles and it does escape it.

We flew on our side, with no lift from the wings, held in place against the sky by an almost imperceptible bank. We did a slow roll, covering ten miles, but to me in the back seat it was not the plane that rolled but the earth that swung over our canopy and around under the belly. We shot across the sky like a rocket and then went straight up—this time really straight—for a mile, doing a slow roll as we went. We were still clocking better than 300 mph when we came out of that one.

Tony throttled back to a hundred miles an hour and the heavy craft retained all the maneuverability of a light plane. He pulled it up into a stall. For a moment it shook impatiently, then dipped into a shallow dive that almost instantly restored life to the controls.

We were crossing the airport at 520 miles an hour at 10,000 feet. Forty seconds later and six miles away, Tony rolled into a vertical dive. We were going to make a straffing run on the airport. The earth flashed up to meet us but it was not drawing us down. We were going faster than its slow moving gravity could ever hope to travel and by the time it got ready to take us in, we would be gone back into the sky.

The dive flattened out and the airport came up over the nose. We were still going down, down to thirty feet, the altitude for low-level attack. The air speed indicator said 570 mph. Corrected for altitude and temperature, this put our ground speed at more than 600 mph. Who-o-o-o-sh!

The airport was behind us and Tony was rolling into a vertical bank. With the wings perpendicular to the ground we shot up 5,000 feet in a climbing turn. The humid Washington air released a gentle fall of snow inside our canopy. So! I had seen that strange snowstorm too.

A long, slow turn at a mere 450 mph took us around the air base and into position for a landing. A warning light flashed, then turned green as the landing wheels went down and locked. At 300 feet and a mile from the runway, we were slowed down to 300 mph. Tony came in high to show me how the plane handled in a slip. A light plane couldn't have been more responsive. A slip without flaps, another slip with flaps and we were slowed down to 130 mph. The runway was dead ahead and we came on in, settling no more than we would in any heavy, single-engine plane. At 105 mph we touched down with a scarcely perceptible jar.

An hour later, when my experiences and sensations had caught up to me, I tried to make a comparison between flying in jets and in propeller-driven craft. I found I couldn't do it. But I noticed a curious thing. I found myself thinking of conventional planes with a touch of nostalgia, a sort of feeling that "those were the good old days." But I have a hunch that the good *new* days will be even better. •

Chop a House, Mister?

[*Continued from page* 73]

soon slowed in their stride by the cost of everything from land to nails. But what really stopped them was the price of lumber, then about $75 per thousand foot in Moscow.

"If," said Halverson, "we had a sawmill we could turn out our own lumber."

"Okay," nodded Kahler, "let's build a sawmill. Shouldn't cost much."

It didn't, either, not the way Halverson and Kahler operate. They picked up a junked tractor for $60 to provide power, repaired it and set it to humming. A second-hand saw cost $75. Needed new teeth but the dental operation was easy. A carriage and track for the logs cost $100, wood frame $20 and miscellaneous items $25. The total added up to $280.

But you don't turn out finished lumber with just a sawmill. You have to have a planing mill, too. Planers are scarce and the corporation had to shell out $450 for a second-hand one.

Now the corporation had everything necessary for turning out lumber but it was running low on money to buy logs. Again Halverson and Kahler started looking around.

They found a farmer in the nearby mountains who had a nice tract of timber. His home had recently burned down and he needed lumber to build a new one. Would he swap timber for finished lumber? He would—and the corporation went into the logging business, cutting down trees, snaking them to the truck and hauling them to the sawmill.

Performing the many and varied roles is not as difficult for the corporation as it might seem. For one thing, the two members have picked up a lot of knowledge from their fathers. Halverson's father is a carpenter and Kahler's is a machinist. Both young men had logged before. Both were pretty green about running a sawmill but a friend who is an expert sawyer started them off. In the Navy, Halverson learned the electrician's trade and, in his first year at the University of Idaho, he picked up the fundamentals of architecture. Business Student Kahler handles the finances besides deftly wielding a carpenter's hammer and a plumber's wrench.

All in all, the corporation is running pretty smoothly. The first house—a five-room Cape Cod cottage with a hillside view of the University of Idaho—has been completed and sold for a nice profit. Another house is on the way. Besides that, the corporation owns a sawmill, a planing mill and a lot of other equipment, all paid for.

"Only fly in the ointment," remarked Halverson, "is my dreaming. Take the other night, for instance. I dreamed that all the teeth in our saw had fallen out. Had to get up and take a look at it just to be sure I *was* dreaming." •

Convertible for a King

[*Continued from page* 85]

wanted a similar dreamboat built on a new Cadillac chassis, you may have to wait a long time. Even Melton, the prize plum for any car builder, got a temporary brushoff because of Frank's big backlog of orders.

Though top engineers in the major auto companies are beating a path to his door for advice on new designs, Frank has had only a brief brush with formal education. Son of a Czech blacksmith, he had already picked up a lot of precious practical knowledge of metal work before he was ten by helping his father in his shop.

At 14 he lied about his age to get a car servicing job with Don Lee, a California race car owner and a Cadillac dealer. In his spare time at home he built himself a hot rod with a Model T Ford motor and scraps from 27 other wrecks. The home-made contraption cleaned up at the local dirt tracks and backfired him into some man-sized money.

During the depression Frank hitched his custom wagon to the trailer business and built the first all-steel house on wheels.

Now Kurtis is about to start production on America's first stock-model sports car in more than a decade. I've had a gander at the blueprints and the finished drawing (see page 82), and take it from me, man—that's *my* new car! The new Kurtis will be a four-seat convertible, midway between an English MG and a Ford in size. A four-cylinder Offenhauser engine, the make Frank prefers for his racers, will zip the car along at 115 mph, if you really want to rocket down the road. Smaller, less expensive motors will power two other versions of this amazing sports car.

Besides turning out completed cars, Kurtis plans to sell the sports models in kit form just as he also does now with his midgets. You'll be able to buy anything from a body and frame without wheels or engine to a complete unit. The full kit ready for assembly will cost about $1500. Putting together a kit car will save your kitty a real chunk of change, since the factory finished Kurtis will sell for $3000 to $5000, depending on engine and extras.

Frank plans to limit his complete sports cars to only 300 a year. He's having fun creating a car that will make every customer a king.

He'd rather keep it that way than turn his slow-rolling dreamboat business into a mass-produced nightmare. You may get a better break though, on the kit cars. They're not quite such a problem to make in quantity, and he expects to base their output a little more in line with the demand. Personally, I know a lot of Jalopy Joes who'd rather plunk out 1500 silver dollars for a hot car in a knock-down package than drop a couple of G's or more into some of the four-wheeled crates now on the market. •

Industry Puts On Freeze

[*Continued from page* 89]

smash through Nazi armor plate. Therefore mechanical apparatus was developed that would continually cool 25 gallons of water per minute down to 50 degrees F.—cool enough to harden the steel shells.

With the advent of stratospheric flying, it suddenly became imperative to know how certain items—delicate operating instruments, engine lubricants, fuels, rubber goods, oxygen masks, etc.—would behave in those mysterious regions of bitter cold and low air pressure.

So now these instruments and materials are tested in a new type mechanical refrigerator in which any degree of vacuum can be maintained as long as necessary. In this way, aircraft materials are given exacting tests at no danger to the fliers or the aircraft.

The most widespread commercial use of cold is for refrigeration. Solid carbon dioxide, commonly called dry ice, has proved about perfect for preserving foods hauled by truck and plane. But while refrigeration is the logical use for dry ice, it has many other unusual applications with more being discovered almost daily. During the war, dry ice made a name for itself for preserving food under army camp conditions where enormous amounts of perishable foods were handled daily and successfully kept from spoiling.

Using heat to make "shrink fits"—close fits between mating parts of an assembly—is an old technique. The old-time blacksmith would heat an iron tire until it was red hot, pound it over a wagon wheel and then cool the assembly in water. That iron tire was on the wagon wheel to stay!

Today, in factories the process is being speeded up by using cold. The inner part of two mating pieces is chilled with dry ice, which shrinks it. When small enough to fit into the other part it is slid in and allowed to warm up. The expansion which comes with heating makes it fit perfectly. The degree of snugness can be predetermined with great accuracy, too.

One rather tricky way in which the aviation industry puts cold to work is in handling crepe rubber. Normally, this material is difficult to cut and shape properly. It's so soft and springy that it gets out of control. When treated with dry ice, crepe rubber freezes into a hard, solid substance. It becomes so manageable that it can be easily cut to accurate sizes and shapes. And the cold doesn't hurt the rubber at all.

So, when icy winds snap at your ankles this winter and the end of your nose starts to turn blue with the cold, don't be too harsh in your opinion of the weather. If it's any consolation to you, that same cold has turned out to be an invaluable friend of industry! •

Futuramic Oldsmobile

[*Continued from page* 91]

The Futuramic is as impressive in comfort as it is in looks. It rides like a royal coach and handles with the greatest of ease. As a family car, it's top-flight. Everybody from little Oscar to Grandpa Albert will enjoy trundling along in luxury to the beach, the mountains or the neighborhood bar. The only trouble with this beautiful picture of an ideal family bus is the trunk. And that's too small even for my luggage—much less for all the stuff a big family would need.

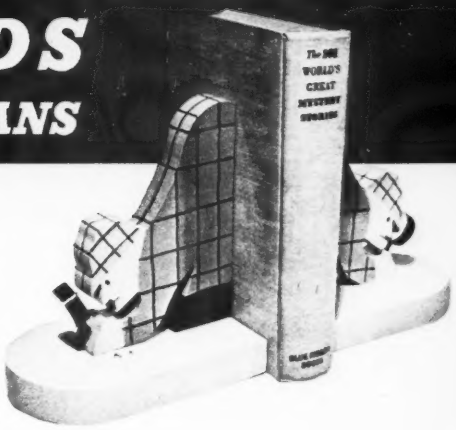
If you want something more than a big, slick wagon for the family, you may want a car with zip in its performance as well as in its lines. Take me, for example. I have to drive some 50,000 miles a year and do a lot of shuttling from coast to coast. I'm sick of all that scenery—I want to get there as fast as reasonably possible, no matter what the weather. I need a car that I can beat up from early morning till late at night. I have to breeze over the roughest roads in the country and I haven't time to keep stopping at garages. I wouldn't feel right trying to put that fancy Futuramic through my cross-country routine. I'd feel as if I were trying to teach Queen Mary how to street-fight. The Futuramic just isn't that kind of lady, either.

The new Olds is not quite as low-slung as it looks. Overall height of the car is a shade more than 64 inches. The width is nearly 79 inches and the wheelbase, 125 inches. The engine is an eight-cylinder, L-head type, with a bore of 3¼ inches and stroke, 3⅞ inches. Displacement is 257 cubic inches. Taxable horsepower is 33.8 but brake horsepower is 115, at 3,600 rpm. Coil springs plus four hydraulic shock ease you over all rough spots.

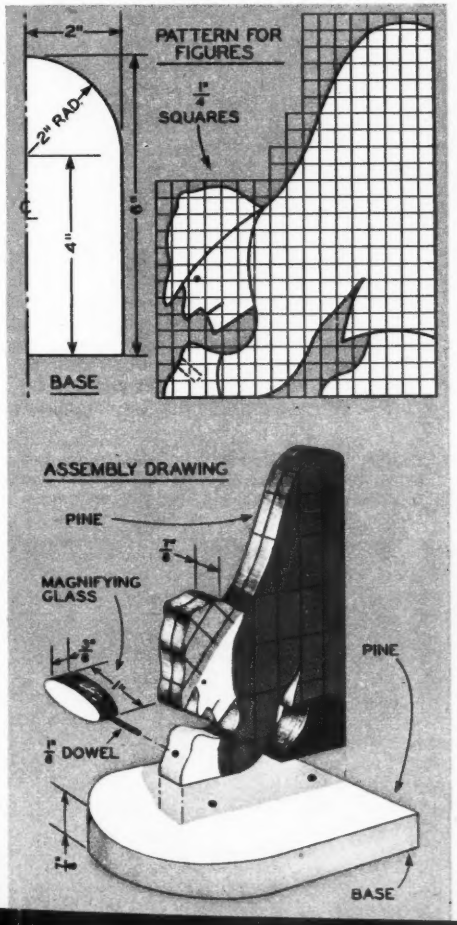
The four-door sedan costs about $2750 for delivery in New York. That puts the Futuramic in some pretty hot competition. Without even going out of the GM line, you have another car that makes you wonder whether you're getting a real drive for your Futuramic money. That's the Buick Roadmaster. With Dynaflow (similar to Hydra-Matic), the Roadmaster packs 150 hp, against only 115 for the Oldsmobile. The Buick's four-door sedan, which has much more speed and power than the Olds, also is selling about $10 cheaper here in New York. Now if that's not tough competition right from the same company, wrap me up in a blanket and call me Crazy Horse.

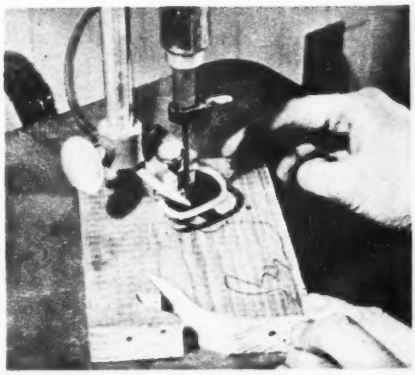
With good values in several other makes in the same price range, I can't go overboard and say that the Futuramic is an outstanding buy for you. If you're looking for comfort, family-car performance but swank lines, Futuramic's the car in your future. But if you're in the market for power and flash, better keep moving, brother. •

BOOK ENDS
FOR MYSTERY FANS



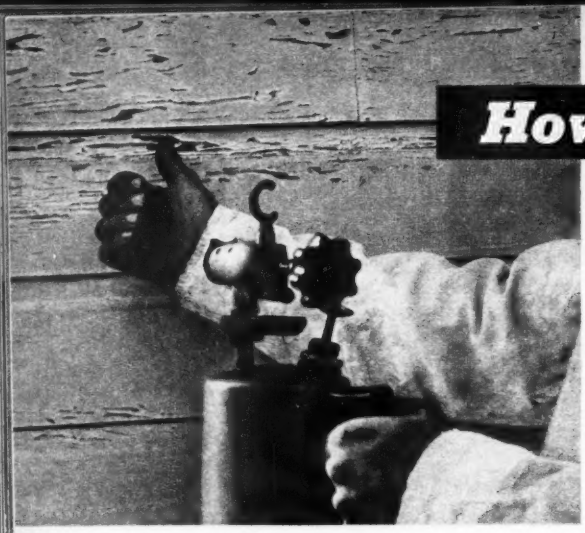
FOLLOWING the clues given in the accompanying photos and drawings, making this pair of book ends should be no mystery for any homecrafter. Draw the figure pattern full size on cardboard, cut out, and trace on ⅞-in. stock; then jigsaw to shape. Dimensions for base and magnifying glass are furnished in the drawings. Paint all pieces before assembly. The coat and hat are respectively orange and green; the face and hands are flesh color; the base is green; and the magnifying glass is white. All details are put in in black. Mount the figure with flathead screws driven up through the base and glue felt to the bottom.—*Carl Sorensen.*





When cutting out the stock, either a coping saw or a power jigsaw can, of course, be employed.

After painting all the parts, assemble them as shown here, using flathead screws and good glue.



How to PAINT YOUR HOME

By John P. Arnold

Examine the exterior—if it is blistered, scaly, loose, or badly checked, it's time to refinish!

If you're the average homeowner, the odds are that your house needs painting badly. At least, that's what the statisticians say; so let's take a quick look outside to see if they're right. Presupposing that no paint has been applied in a year or more, we can expect to find either one of two conditions.

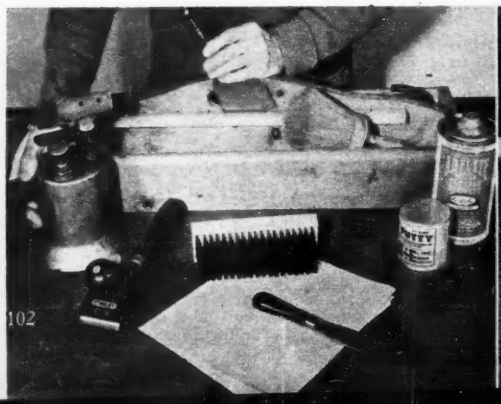
The sign of Condition A, that resulting from just normal wear, is a faded and lusterless surface which, when you rub it with your hand, gives off a fine, chalky powder. If the exterior of your house is in Condition A, you're lucky—the finish has just begun to lose its protective quality and a coat of full-bodied paint is all that's necessary to restore it to its original state.

Condition B, though, is much more serious. The symptoms here are raised blisters, a checkered surface, and loose, scaling paint. The wood underneath may, in places, be damaged. Complete refinishing is the only worthwhile prescription.

With modern, ready-mixed paints, however, your job is somewhat easier than it would have been a few years ago. Newly developed primer-undercoaters combine both penetration and coverage in one coat; so but two coats in all are needed. When preparing this story we used Dutch Boy Primer followed by a coat of Bright White and recommend both the two-coat system and the brand.

As long as the original paint adheres firmly to sound wood, light sanding or wire-brushing is sufficient to ready the work. But when the paint has lifted, blistered, or checked, it must be completely

When removing old paint and reconditioning the surface before painting, you'll need all of the weapons and equipment that are depicted below.



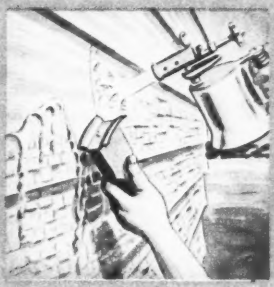
For the average house, the variety of brushes shown below will do the trick. When purchasing brushes and paint, buy only the finest grades.

To take down a grimy or chalky surface, use a wire brush and follow up with fine sandpaper and an excess of elbow grease.

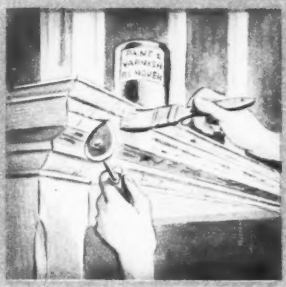
If there are raised blisters, use a wide-bladed putty knife first; then level the surface by energetically sanding it.

Where the surface is old and checkered, the best treatment is to apply a stiff wire brush and finish off with sandpaper.

Small areas of loose paint are easily handled if you employ a hook-type scraper and again finish the job with sandpaper.



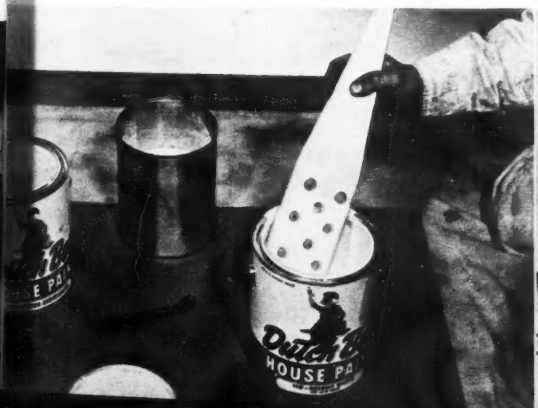
Large areas of loose paint are the worst problem. They must be carefully softened with a blowtorch; then scraped clean.



Apply a thick coat of paste paint remover to molding and sash and let it stand for half an hour; then scrape it off.

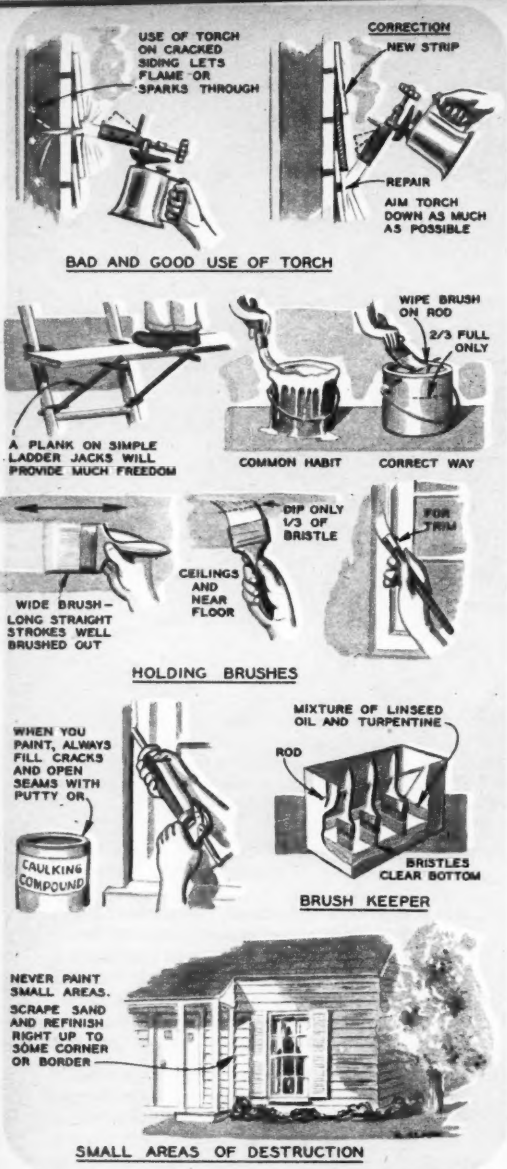
removed. If this destruction occurs only in small areas, scraping is sufficient, although it is difficult to avoid a patched appearance unless all the paint is removed over a considerable area.

Where defects are widespread, the old paint must be removed with a torch. This is a hazardous operation. The danger lies in the possibility that sparks may get behind loose siding and later break out into flame. So before using a blowtorch repair all defects in the siding. When using a torch, play the flame rapidly over only a small area and follow up with a scraper to



The finest paint made isn't any good unless it is thoroughly mixed. If your paint dealer does not have an electric mixer, use a stout paddle.

After you finish, carefully clean the brushes. This isn't any fun, but remember you're going to use them all again someday; so be thorough.



remove the softened paint. For cleaning moldings and trim, use a paste paint remover and a scraper.

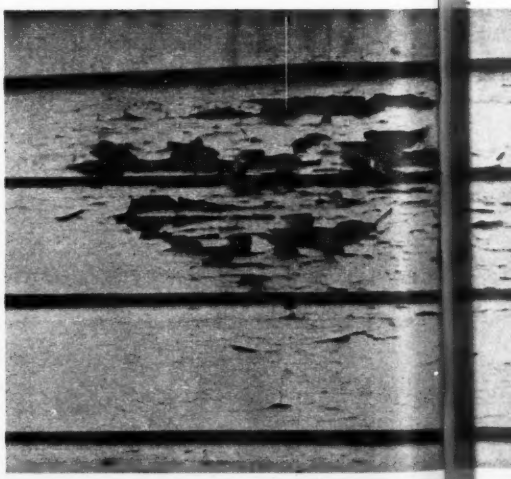
Good painting requires good materials. Take the brushes for instance. Professional painters prefer round or oval brushes with which paint can be spread more evenly, but for average work flat ones are quite acceptable. A minimum assortment consists of a 1½-in. oval sash brush and 3 and 5-in. flat brushes. At current prices, these will cost from $10 to $12.

Brushes are no better than the treatment they receive. New ones should be worked between the fingers to remove loose bristles; then immersed in linseed oil thinned with turpentine for about 12 hours. Between jobs, suspend them in the same solution or clean them thoroughly with a brush conditioner. Wrapping a brush partially loaded with paint in waxed paper to exclude air is a simple way of keeping it soft for a day or so.

Now for the paint itself. For economy, buy one container holding the amount you will require rather than a number of smaller cans. If work is to be started soon after the purchase of the material, it is worth remembering that most paint stores have mechanical mixers that agitate the contents of a can more thoroughly and with less effort than you can. If you must stir by hand, pour the top oil off into a separate can and stir the remainder, meanwhile gradually pouring the oil back in.

The quantity of paint required for a job is determined by roughly computing the over-all area in square feet and deducting for the various openings. Coverage is about 500 sq. ft. per gallon for primer and 600 sq. ft. per gallon for finish coat. An experienced painter can cover 25% more area with the same amount of paint than can the amateur. Exterior paints should be brushed on with long, sweeping strokes—there is nothing to be gained by flooding the surface with paint.

Here's what may happen if you don't clean off all the long-accumulated grime before you apply any paint at all to your house.



A common fault is to paint visible surfaces carefully but to neglect the bottom edges of siding, the tops of door and window frames, and other places that don't meet the eye. As these are the spots where moisture collects, covering them is important from the standpoint of protection.

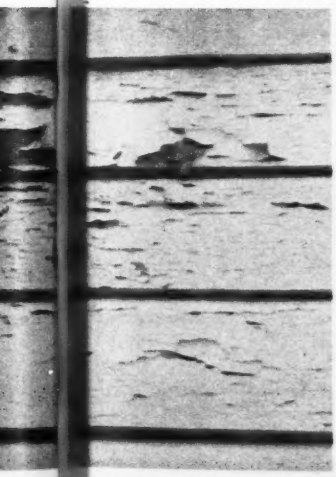
When painting a house, work from the top down. Painting is a fair-weather job; so plan to do it in the spring or fall when the weather is settled. Another reason for choosing these seasons is that leaf-bearing shrubbery close to the house will be bare. Many painting failures may be traced back to the fact that the surface was either damp or drenched with sunlight while being painted. If you must paint in hot weather, paint "behind the sun"; that is, start working in the morning on a portion of the house that the sun has just left and, as the day progresses, follow Old Sol around the house. This prevents the oils in the paint from being drawn to the surface by the sun's heat.

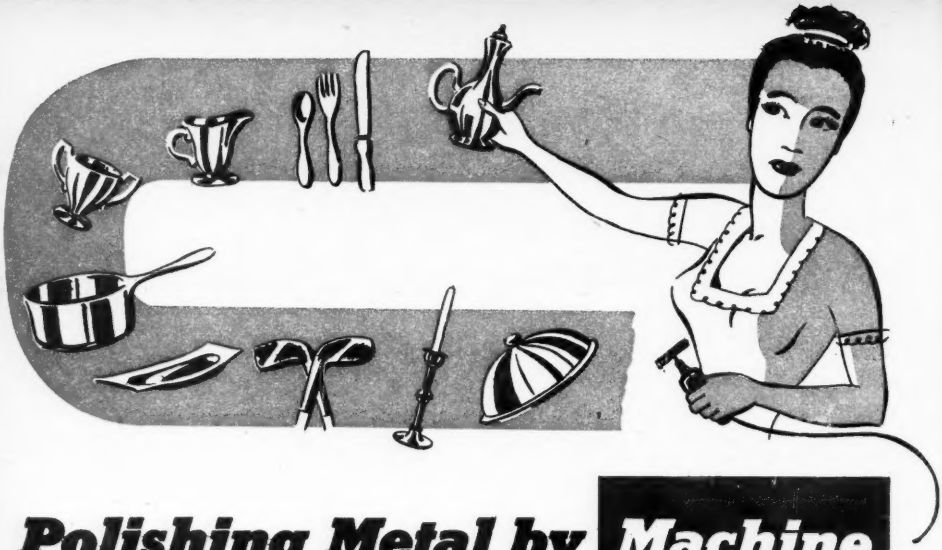
In working on siding, the edges should be painted first; then the faces. Do only a few boards at a time in order to avoid unsightly laps caused by brushing over paint that has already set. If the paint is laid on evenly and brushed out carefully, there won't be any runs and sags and the thin, economical coat will adhere properly to the surface.

Ideally, sashes should be removed for painting, but this is rarely done and is perhaps unnecessary if the original paint is sound. Examine the glazing putty and renew it if worn and cracked. A tin shield can be used as a mask to prevent brushing paint on the glass. If you should get any paint on the glass, remove it at once with a cloth dampened in turpentine.

For painting in high places, an extension ladder is ideal. If two ladders are available, by all means secure a pair of ladder irons so you can run a plank walk between them. A stepladder is handy when painting the lower part of the house. A calking gun filled with compound is useful for sealing door and window frames. •

If thought of all the work involved depresses you, cheer up. Suppose you had to scrape down and refinish a huge old farm house like this!





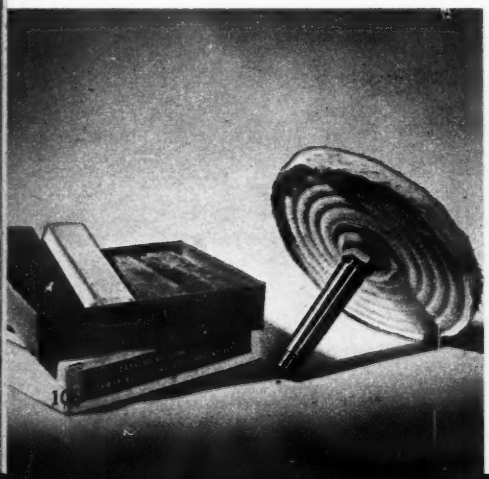
Polishing Metal by Machine

THE little woman will extend her love to your home workshop, too, when she sees how neatly you can put a factory-fresh finish on articles of metal around the house. Learning to use a buffing wheel isn't difficult and with it you can remove the dull film from plumbing hardware, to silverware. The shiny, burnished finish will actually be a new surface. Jewelry, brassware, steel and aluminum utensils—they all glow quickly after an introduction to the polishing department.

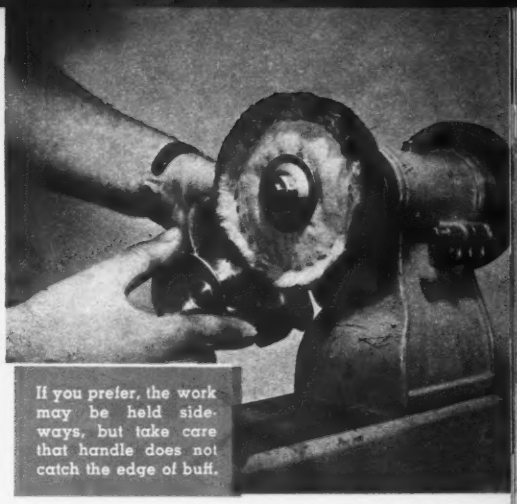
Materials required for power buffing are not expensive and consist of buffing compound, a work arbor and a buff. The arbor shown has a No. 2 Morse taper to fit the headstock of a lathe. Other arbors are available to fit a drill press or even the shaft of an electric motor. Of course, a buff can be fitted directly to the spindle of a grinding head or power grinder.

Standard buffs have 18 to 54 plies, which may be sewed or loose. The former are generally used with abrasives to prepare the work for the final finish, and the loose buffs, with burnishing compound, give that final finish. Several buffs may be used on one arbor for additional thickness. Soft, fluffy cotton yarn or flannel buffs are made for imparting a brilliant finish to precious metals. Ordinarily, two muslin buffs about 6 in. in diameter will be adequate for home

A set of buffing compound bars, a muslin wheel and an arbor to fit it to a lathe are all you will need to do a professional job of polishing metalware.



Apply the compound at a point slightly below the center of the buff. For final burnishing the buff should be run at a high speed of 3,000 to 4,000 rpm.



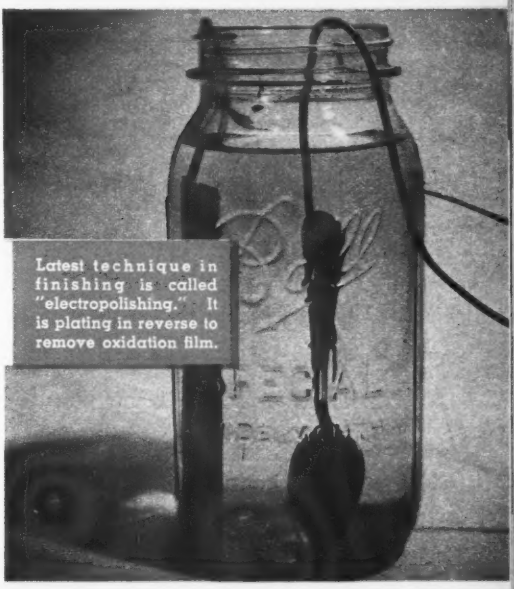
If you prefer, the work may be held sideways, but take care that handle does not catch the edge of buff.

Work to be polished may be held in this position with the mouth of the creamer facing same direction that the wheel is turning. Hold work tightly.

use, one being reserved for buffing the more common metals and the other for silverware and the like. Local hardware stores usually have these.

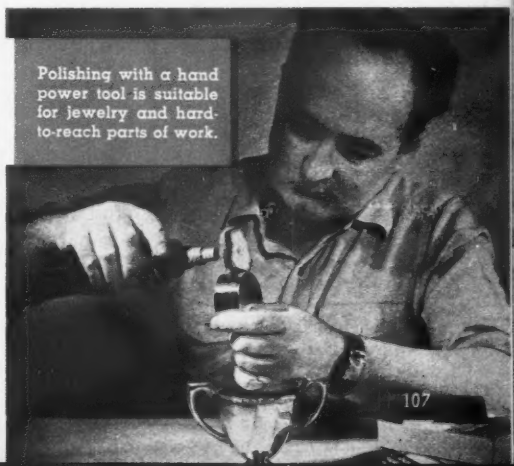
The top of a buffing wheel should always turn towards the operator. The photograph shows how a bar of compound is held against the underside until it is well coated. It is occasionally touched up as required.

Buffing is actually two different operations, preliminary and final. Black emery compound is often used for the former to remove rust and scale from tools, golf clubs, cast iron and steel. Brown tripoli compound cuts less vigorously and is used for preliminary [*Continued on page* 138]

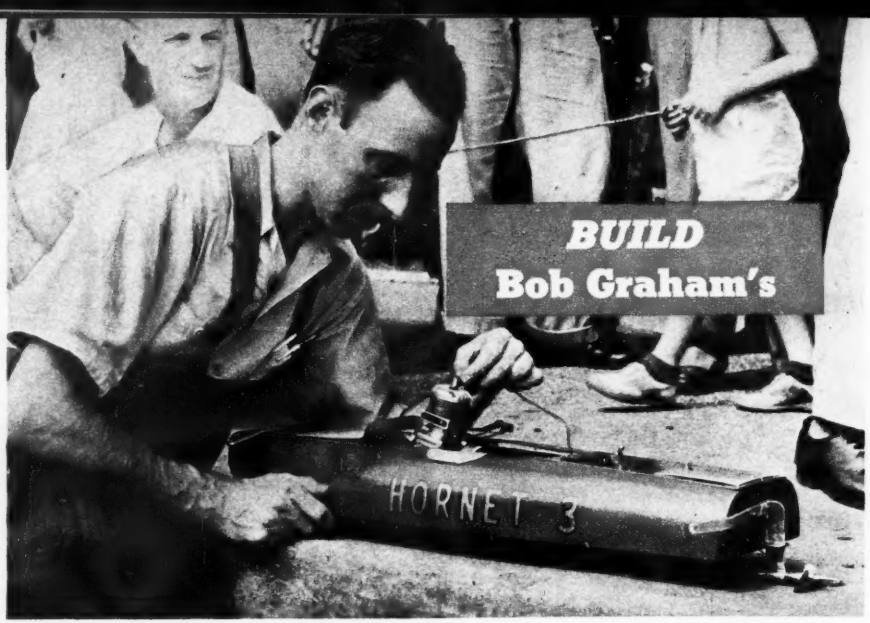


Latest technique in finishing is called "electropolishing." It is plating in reverse to remove oxidation film.

Never, never start polishing with the buff head-on against an edge. The cloth will pull it from your hands and most likely hurl it across the room.



Polishing with a hand power tool is suitable for jewelry and hard-to-reach parts of work.



BUILD Bob Graham's HORNET 3

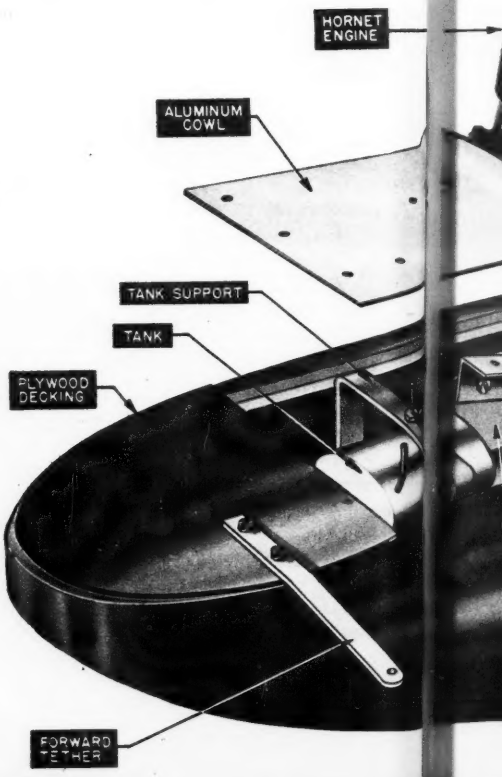
Made from balsa and plywood, this 28-inch three-step hydroplane is capable of speeds of 40 mph and up. An ideal project for the novice speedboat fan.

Photos by the author

HORNET 3 is the result of well over ten years of constant experimenting with model speedboats. Thoroughly tested, most any model builder can quite easily duplicate this project and watch it tickle the surface of any pond at speeds of 40 to 50 mph. Faster boats have been built but for all-around stability and performance, Hornet 3 has little left to be desired.

Of course, everyone realizes that correct hull design is a major point when tackling the problem of speed but let's not sell engines short. Without a proven racing engine you might as well be racing a plank and while most any of the better .60-.65 cubic inch displacement engines can be installed, use of any powerplant other than a Hornet, McCoy 60 or Dooling is not recommended.

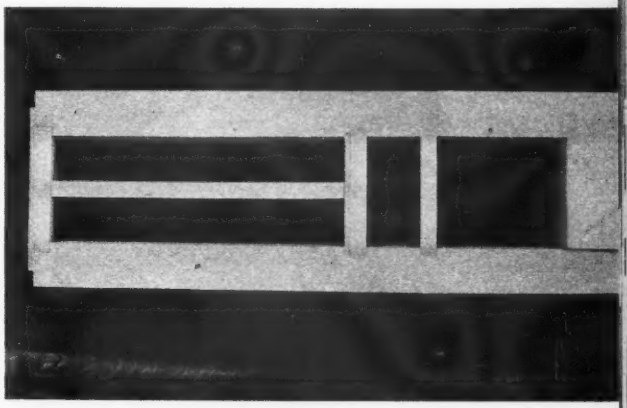
Before starting construction, study the plans carefully so you will have a good idea as to just how the hull is constructed. You'll note it is built from balsa and plywood joined together with round toothpicks, brass screws and



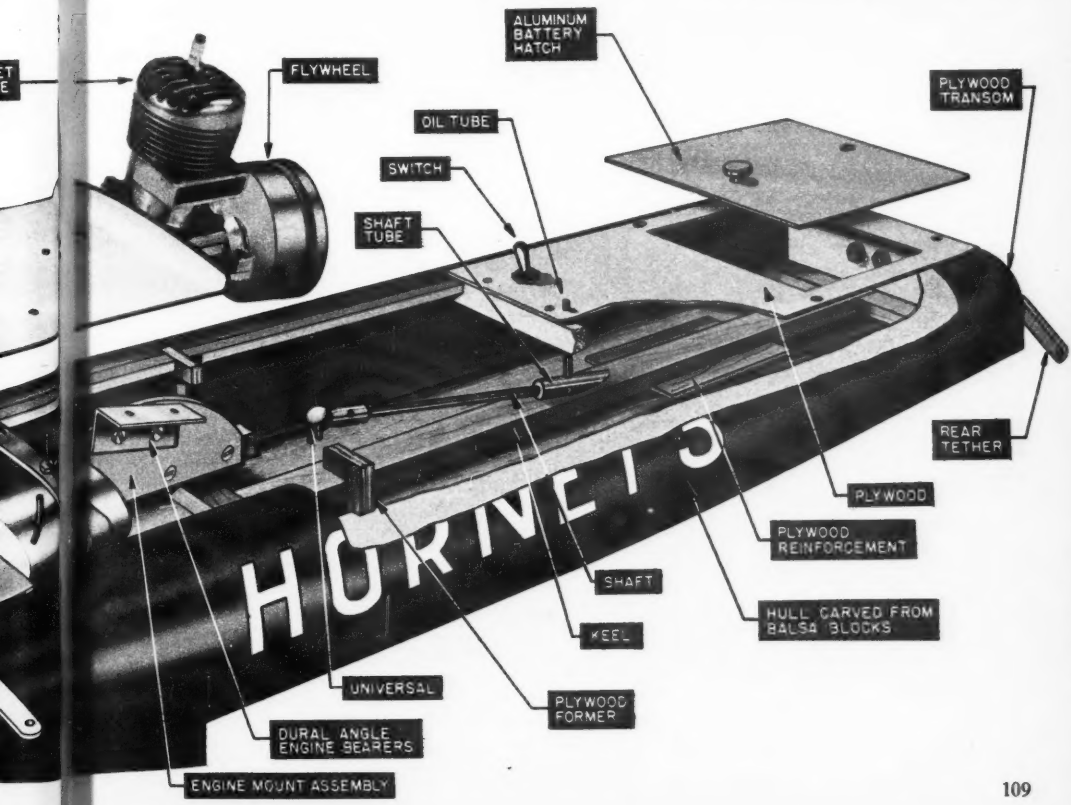
Weldwood, Cascomite or regular model airplane cement (Model-Weld, Testors, etc.). The strut assembly and engine coupling are not hobby shop items because model boats of this type have not reached the stage where manufacturers will produce the precision fittings necessary. You will find substitute fitting available in hobby shops but don't deviate too much from the design of the metal accessories shown. If you can't make the fittings yourself then get a friend who can or else approach your local machine shop.

A word of advice when making the hull. If you want to change the shape of the top of the boat you can but *don't* alter the basic dimensions of the pontoons and strut assembly. This boat was built with a high freeboard because it was used in fairly rough water. If you plan to run in smooth water and can walk to retrieve the boat when it stops, making the hull 2 or 2½ in. high will add considerably to the performance.

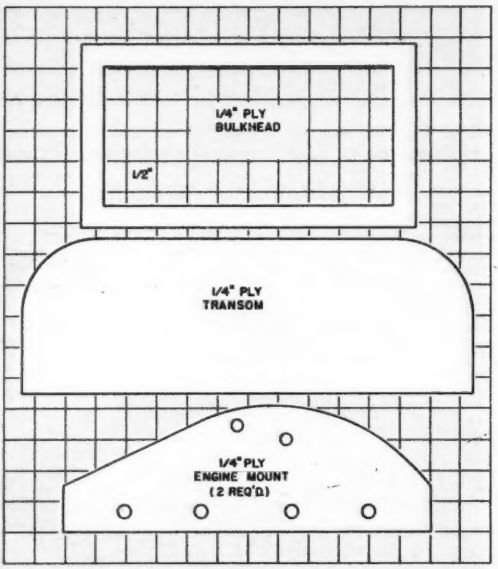
Start construction by obtaining two pieces medium hard balsa measuring

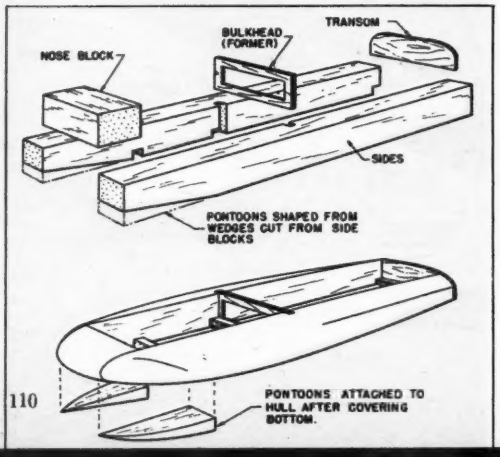


After the balsa sides are cut to size and notched, the shaped plywood transom and the balsa nose block are cemented in place.



The transom is cut from ¼ in. plywood and cemented in place before the sides are rounded off. Note toothpicks extending through plywood and into balsa blocks. Use cement freely between parts.



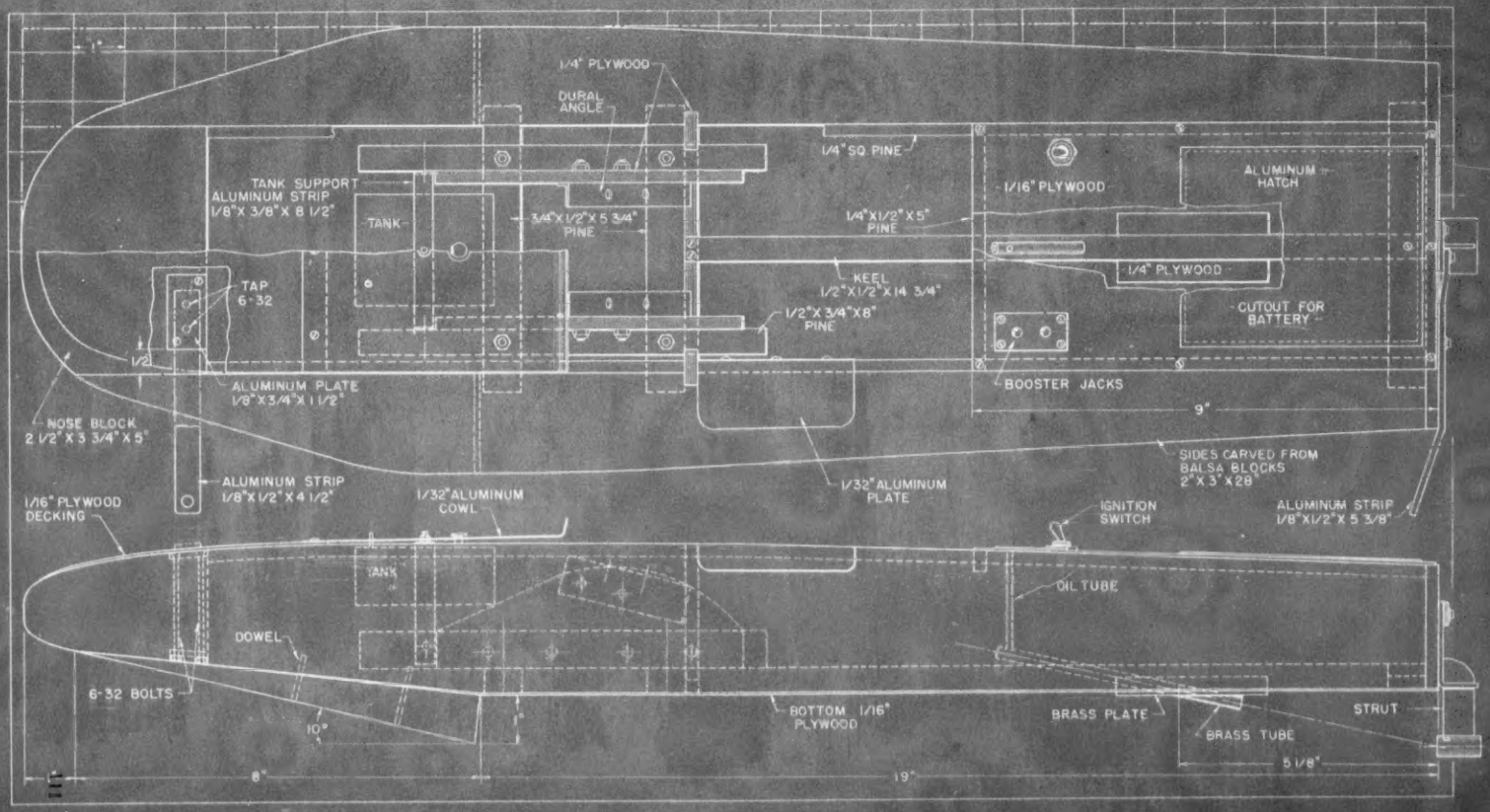


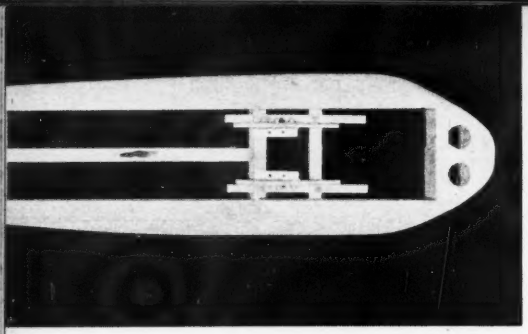
2x3x28 in. Lay out the wedges (pontoons), carefully cut them off and set aside. Then cut the ¼ in. deep slots for the frame. Keeping these slots to the inside, line up the 2½x5x3¾ in. balsa nose block. Use model airplane cement and clamp this block between the side pieces, as shown. While the cement is drying, lay out and cut the stern piece from ¼ in. plywood, preferably 5-ply aircraft stock. Next, obtain a box or two of round toothpicks and cut them in half. When the nose block and sides have set, line up the stern piece against the ends and mark off the position where you can drive toothpicks into the ends.

Now obtain a straight flute wood drill bit and grind it down until it will make a hole about $\frac{1}{16}$ inch in diameter. Drill about 8 or 10 holes in the stern piece, spread cement on the area to be glued and place the stern in position. Dip the toothpicks in glue and drive in with a small hammer. Now apply pressure to hold the assembly secure.

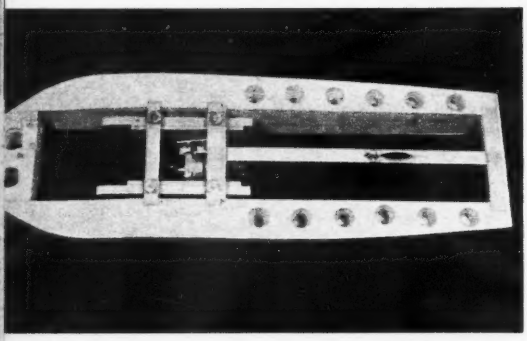
Cut out the frame, keel and cross braces and make cross-lap joints on the ends of the keel and two of the cross braces. Next, lay out and make the engine mount assemblies. The dural angle pieces used on the original boat were fitted with elastic stop nuts peened over on the bottom. If preferred, you can use tapped steel plates under the dural or if the dural is thick enough, tap it 6-32 for the engine bolts.

When the stern has set, spread glue in the frame slots and push the frame in place. Mark and cut into the balsa sides next to the stern and attach the rear cross brace, using glue and toothpicks. Now set in the two forward cross braces and then add the keel. When the cement has dried, proceed to mount your engine by cutting off the top of the frame and sliding the engine mount in position. Clamp the strut assembly in place and line up with the


1/4" PLYWOOD
DURAL ANGLE
1/4" SQ. PINE
TANK SUPPORT ALUMINUM STRIP 1/8"X 3/8"X 8 1/2"
TANK
3/4"X 1/2"X 5 3/4" PINE
1/16" PLYWOOD
ALUMINUM HATCH
1/4"X1/2"X 5" PINE
1/4" PLYWOOD
KEEL 1/2"X1/2"X14 3/4"
1/2"X 3/4"X8" PINE
CUTOUT FOR BATTERY
TAP 6-32
1/2
ALUMINUM PLATE 1/8"X3/4"X1 1/2"
BOOSTER JACKS
9"
NOSE BLOCK 2 1/2"X 3 3/4"X 5"
SIDES CARVED FROM BALSA BLOCKS 2"X 3"X28"
1/32" ALUMINUM PLATE
ALUMINUM STRIP 1/8"X1/2"X 4 1/2"
1/16" PLYWOOD DECKING
1/32" ALUMINUM COWL
IGNITION SWITCH
ALUMINUM STRIP 1/8"X1/2"X 5 3/8"
TANK
OIL TUBE
DOWEL
6-32 BOLTS
10°
BOTTOM 1/16" PLYWOOD
BRASS PLATE
STRUT
BRASS TUBE
5 1/8"
8"
19"

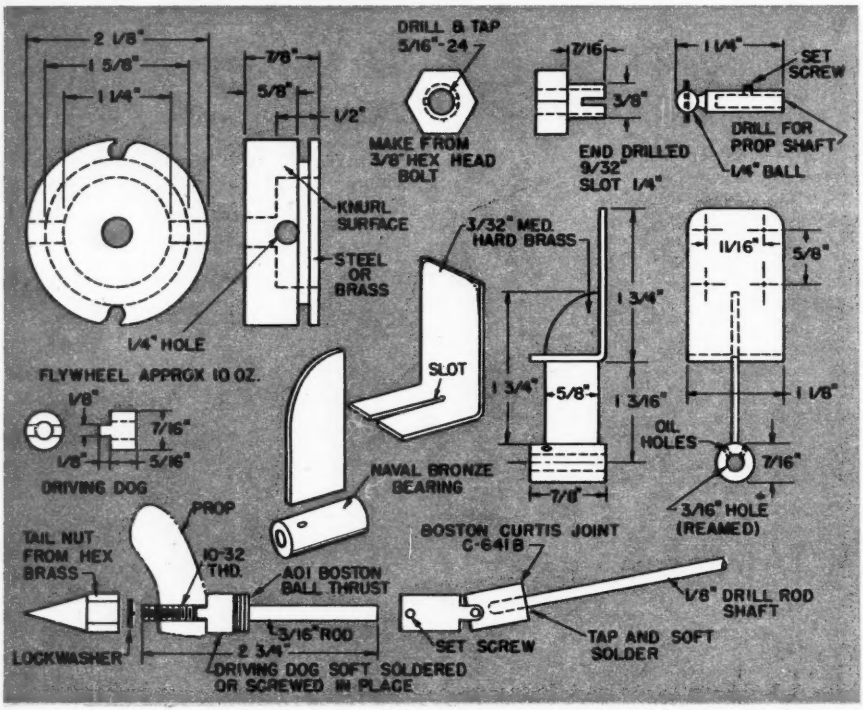


Above: Top view of hull framework before plywood bottom was attached. Note hole in keel for shaft housing. Side pieces are rounded off with a plane and sandpaper.

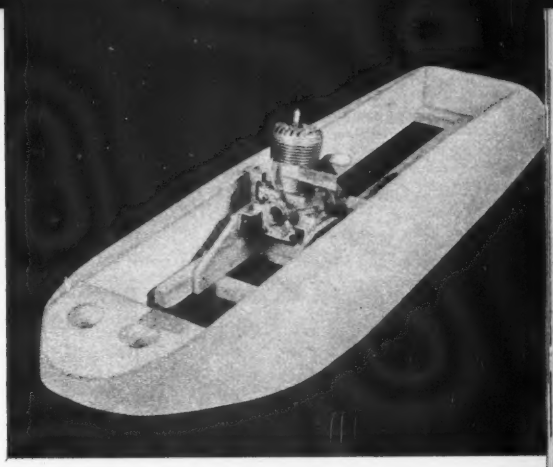


engine, using a piece of 1/8 in. drill rod. Mark the angle of the shaft on the side of the keel for a guide and carefully burn the shaft hole through the keel with a red-hot pointed piece of 1/8 in. diameter rod. If the wood flares, just blow it out. When you can line up the engine and strut with a piece of shaft through the hole, mark and drill holes for the strut and then fasten the latter in place. Now mark and drill the holes for the bolts, holding the engine mount assembly to the cross braces. Use flat-head brass bolts with pieces of brass soldered to the underside of the heads. Insert from the bottom of cross braces and bend the flat brass against the sides of cross braces. Flat washers and elastic stop nuts are used on top of the mount assembly. Check the line up of the strut with the engine and then remove the strut and engine mount assembly.

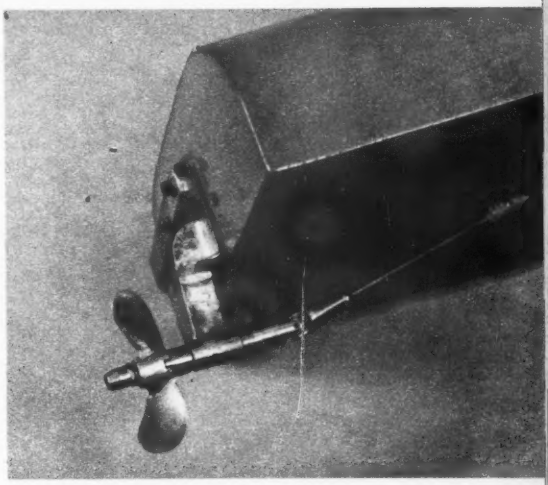
Left: Underside view of hull framework. Holes in side pieces and nose block pieces were drilled to decrease the weight and are not necessary except for racing.



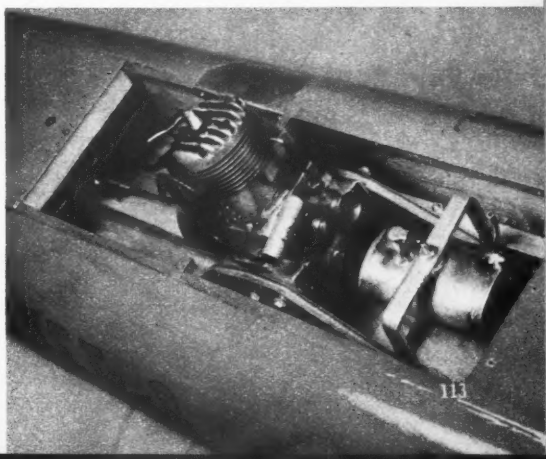
The next job is to shape the sides of the hull to conform with the top view. When drilling the holes in the side pieces, be careful not to go too deep or too close to the edges. Make the two aluminum pieces for the forward tether mount and insert them in the nose block. The top piece is tapped 6-32 and the other is drilled clearance for 6-32 threaded rods. When the pieces are in position and the rods are threaded into the top piece, nuts are put on the bottom and drawn up tight. The rods are then filed flush. Measure where you can drill two holes in the top piece so when the deck is on you can locate the position. Lay out a piece of $\frac{1}{16}$ in. aircraft plywood for the bottom, leaving about ¼ in. around the edge for trimming. If you have drilled "lightening" holes in the sides, you better mark the position of them so you can drive toothpicks into wood—not holes. Mark where the bottom has to bend upward near the nose from the step forward. Heat an electric solder iron and when it is just too hot to put your hand on, press the plywood against the barrel of the iron and bend. Hold the wood against the iron for a minute, being careful not to let the iron scorch the surface. With a little care, the wood will go into shape. Now drill a series of holes for toothpicks, prepare clamps and glue. Make certain the engine mount bolts are inserted through the bottoms of cross braces and then spread glue on the surfaces and drive the toothpicks in place. Clamp the bottom, using scrap wood between the clamps and boat and trim off the ends of the toothpicks when the cement has dried. Cut the bottom and nose block to shape and then mount the square pine deck beams. Place the pontoons in position and, if necessary, sand to fit snug against the bottom. Now lay out and drill each piece for the ¼ in. [*Continued on page* 136]



Top: Before mounting the shaft housing permanently, bolt your engine in place to check proper line-up. Then remove engine and cover bottom with 1/16 in. plywood.



Top: Strut and shaft assembly is built up as indicated on opposite page. Note the universal joint and keyed prop. The secret of good performance is correct alignment here.

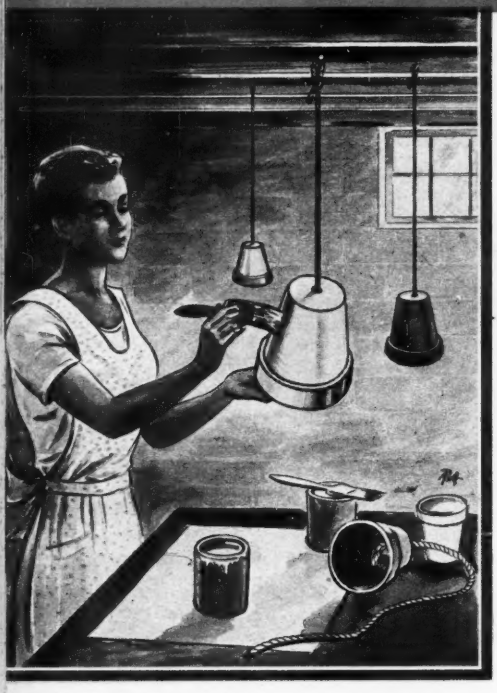


Right: Hornet engine installed. Notched flywheel makes possible use of string for starting. If desired, notch may be omitted from the flywheel and the engine started using a length of strong adhesive tape instead.

FULL SIZE PLANS

of this model will greatly simplify construction. Send 50c to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please be sure to specify Plan No. 393

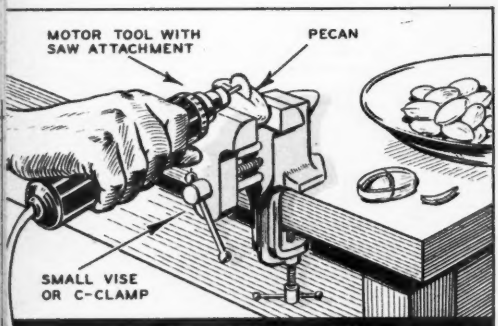
Home Hints

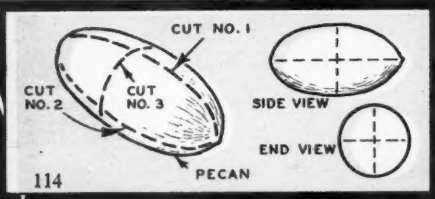


Flower Pots hung on ropes are easy to paint. Simply tie a knot in one end of rope, run through hole in bottom of pot, and hang. Leave suspended until dry.

For Chessmen of plastic, which are so easily upset, you can add stability by weighting the bases with air-rifle shot, holding it in place with plastic composition wood.

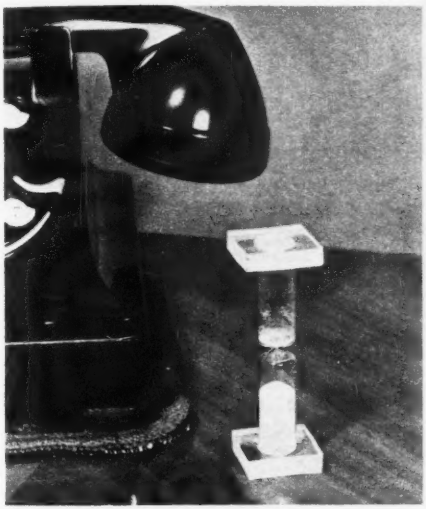
Follow the Dots to return rug to its exact position every time. Put small dot under each corner, using a grease pencil, a little bright nail-polish, or some gummed signal dots.

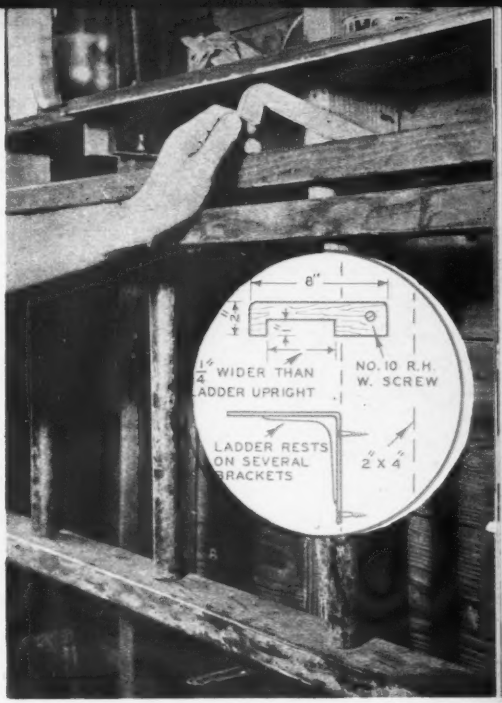




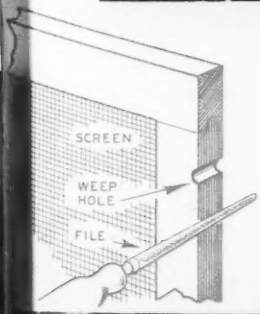
To Shell Pecans and obtain a fair number of whole kernels, use a motor tool equipped with a small saw. Cut the shells into eight parts, following the procedure shown at left.

Overtime phone talks because you don't know how long you have been talking can run up your telephone bill. To prevent this, use an egg-timer sandglass.

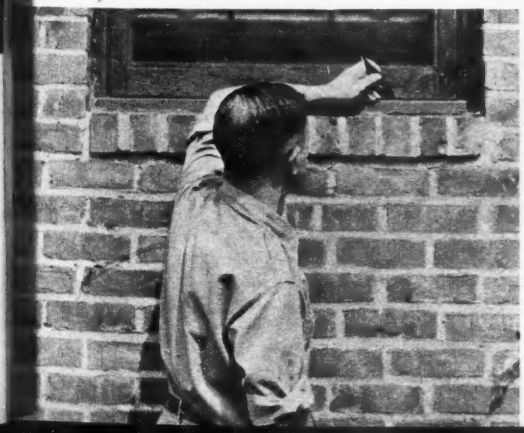


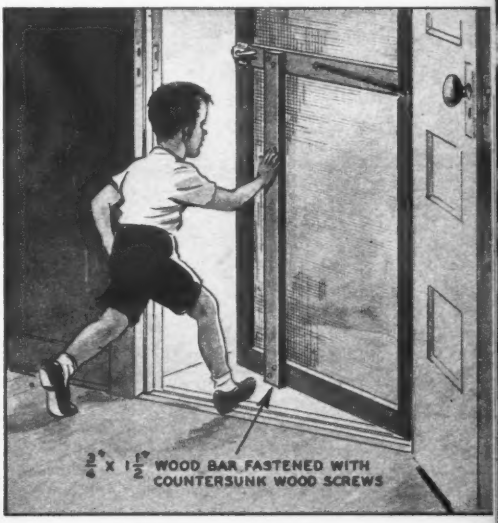


One Hook-and-Ladder combination that doesn't go to fires, this ladder-storage plan employs standard shelf brackets and ½-in. plywood hooks.



Scuppers, or weep holes, at bottoms of screens will drain off rain water, keeping it from backing up over the sills and ruining the finish on interior walls. Two holes should be filed at the bottom of each screen, using a ¼-in.-dia. rattail file.





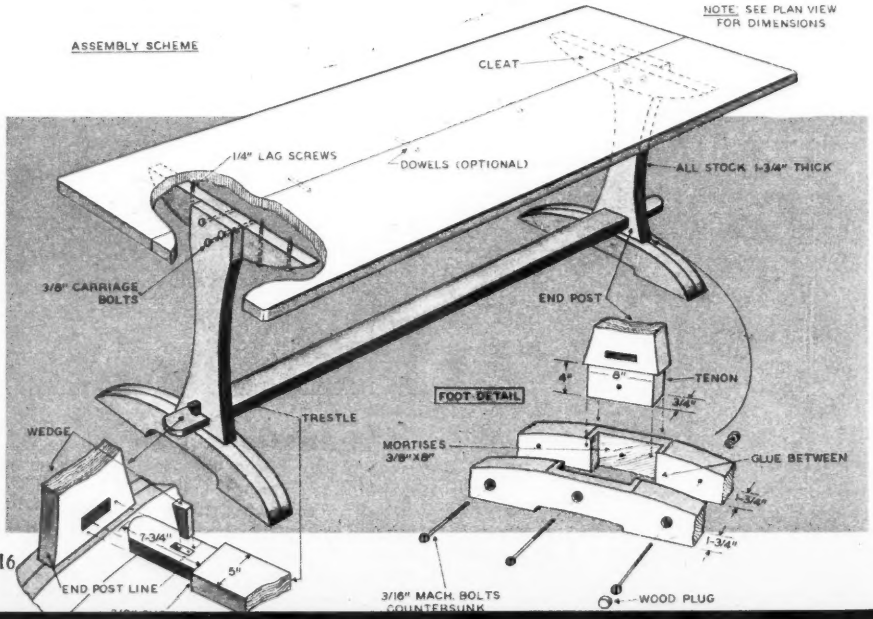
Screen-Door Life can be prolonged in a home with small children by installing a vertical push bar to keep the tots from pushing against the screen itself. Fasten bar with countersunk wood screws.

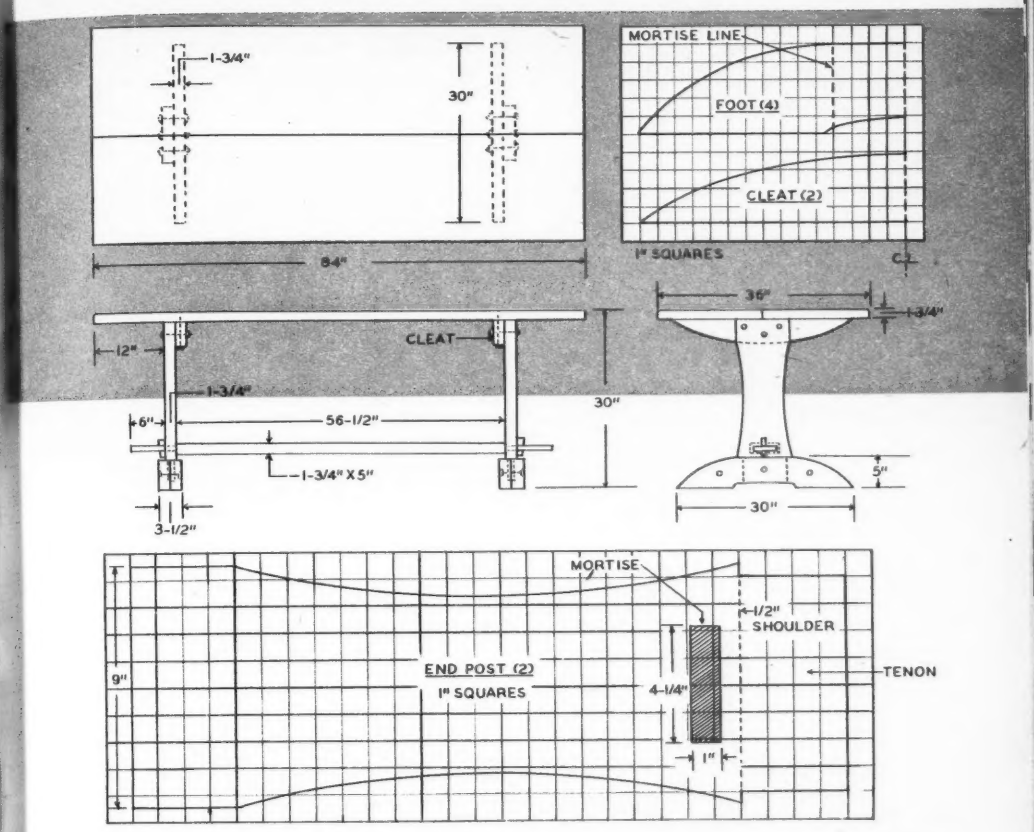
COLONIAL TABLE

A beautiful, enduring piece of furniture that is sure to become a treasured heirloom.

By Roland Cueva

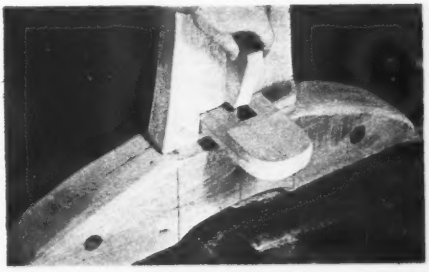
IF you've ever wished for a piece of furniture as enduring as that made by our colonial ancestors; something you could keep all your life and then pass on to your grandchildren, this table is for you. There's nothing flimsy or Grand Rapids-like about it. When you finish it you'll have a table you couldn't buy in any store—they don't make 'em like this commercially. Underneath the graceful design is solid construction that will literally stand up for generations. It's a big table, 7 ft. long, and it will seat eight people comfortably. If your planned space won't accommodate this dimension, cut it down to 6 ft.—you'll still have a table that's tops. Use it anywhere; living room, dining room, porch, garden or basement rumpus room. Give it a fine, formal finish or leave it rough. That's up to you, but it'll look well either way.



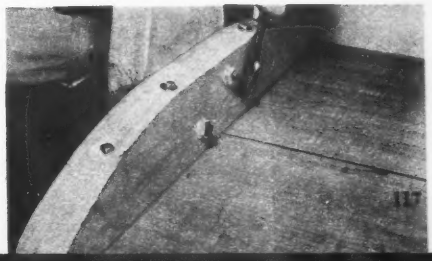


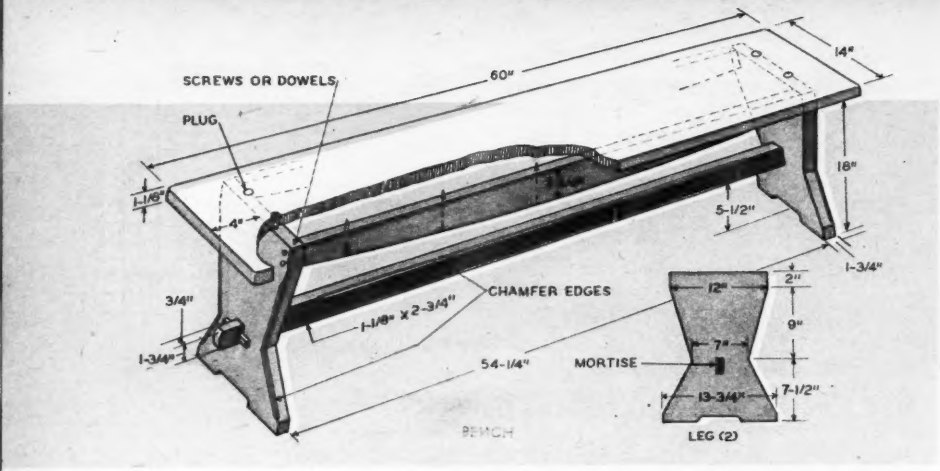
The original table in the photographs is made of African mahogany, selected not only for its beauty and ease of working, but because planks of this wood are available (Ichabod T. Williams Co., New York City) in widths up to 18 or more inches; hence the top could be made in only two pieces, joined at the center line. However, pine, fir, cypress, redwood or oak will make an equally good table. Get maximum width planks in any of these woods and join them to secure full top width. The feet are made of two 1¾-in. pieces, bolted and glued to make a 3½-in. thickness. This was done because of the difficulty in obtaining lumber of such weight, but if you can get it, make the feet of one piece instead of two.

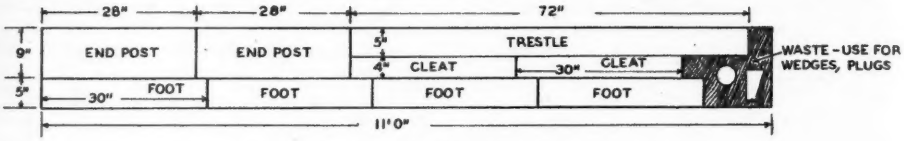
Start by drawing full-sized patterns on cardboard of the end posts, feet and cleats, using the squared sketches as a guide. Be sure to mark the full trestle mortises on the end posts and the half mortises in the foot sections, into which the end post tenons fit. Now cut out the patterns carefully with a scissors and transfer them to



Above: The wedge for the feet should be cut on the spot to make sure of a snug fit. Below: Tightening up the lag bolts. Use washers under heads.







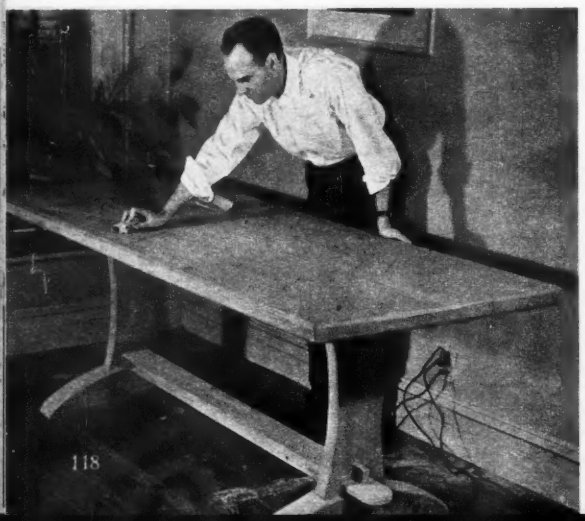
LAYOUT OF TABLE UNDERPARTS ON PLANK
1-3/4"X14"X11'0"

the lumber. All underparts can be laid out for sawing on one, or two, planks, as shown.

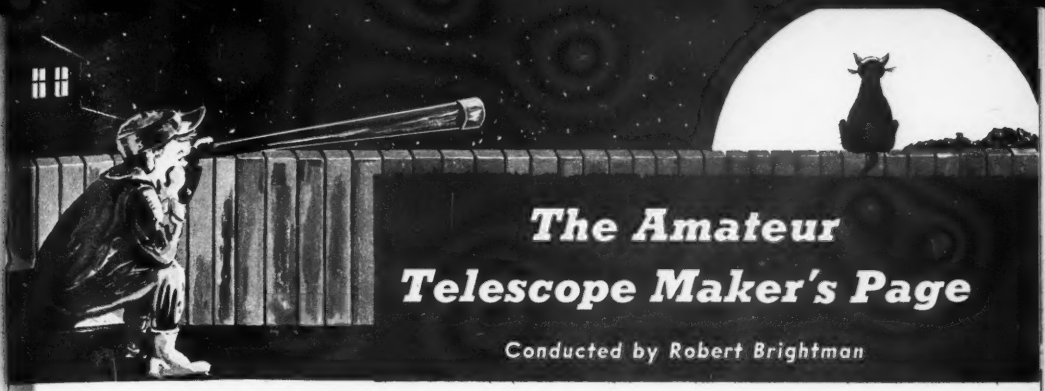
Cut the parts with a bandsaw, keeping just outside the pattern lines. Next step is to cut the tenons on the trestle, the two end post mortises, the feet mortises and mortises for the wedges that will hold the trestle in place. The feet mortises can be cut on a circular saw. Set the blade for depth and run the feet through until the mortise sections are sliced in ribbons of wood. Clean out with chisel and mallet. The other mortises must be cut by hand (unless you have a drill press with a mortising attachment). Make guide holes with brace and bit, then do the final clearing and squaring with a chisel and mallet. All tenons can be cut on the circular saw, or with an ordinary hand saw.

The top presents no problem. It is made up of square-edged pieces, either two or more, as previously mentioned. These planks are doweled and glued together in orthodox manner, using cabinet maker's clamps or large pipe clamps to hold them tight until the glue has set. Before assembly, bevel all edges and sand all the pieces thoroughly. This is much easier to do at this point than after the parts are joined together.

Because of its size and weight, the table is built up from the floor, with the top going on last. Place the two halves of each foot together, lining up the mortises carefully. Insert the end post tenons into the feet and clamp everything together very tightly. Now drill the three holes for the machine bolts through each foot, as indicated, with countersunk holes on each side. Unclamp the feet, coat all joints well with glue. Be sure to run plenty around the mortises and tenons, reclamp, insert [*Continued on page* 142]



Sanding the top before applying a coat of shellac to seal the wood. Three coats of varnish, each lightly sanded, are next.



The Amateur Telescope Maker's Page

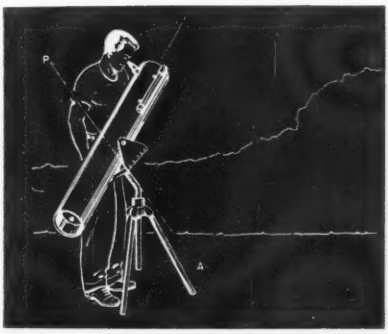
Conducted by Robert Brightman

The response to the series of articles describing the construction of a reflecting telescope has prompted the Editor to devote this space each month to the Amateur Telescope Maker. Pictures of completed telescopes, short cuts and kinks are welcome. They will be paid for at prevailing rates.

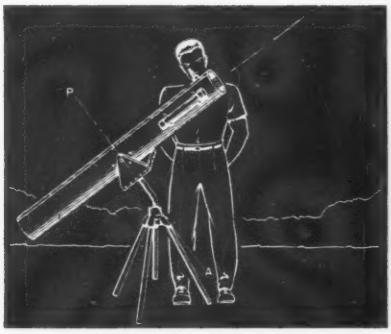
The Equatorial Mount

IN order to view a star or planet two motions of our telescope are required. A swing from left to right will bring the tube below the star and then another movement, upwards, will put the telescope on the star.

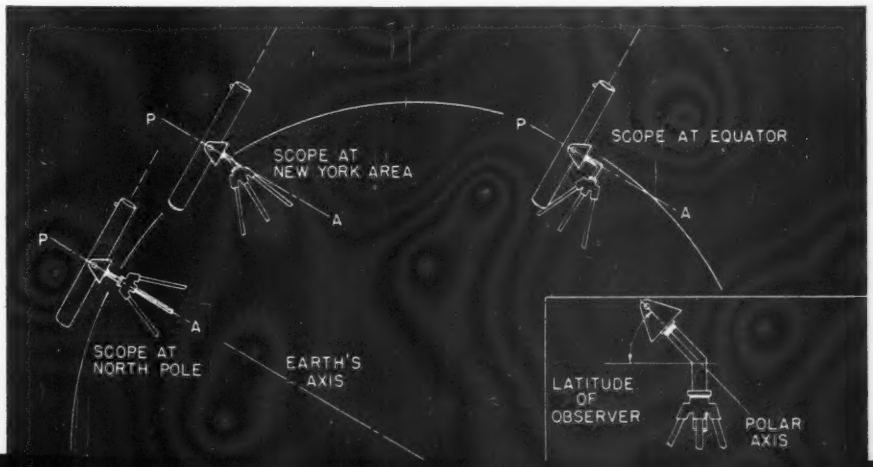
However, if [*Continued on page* 140]



The angle of the polar axis, PA, is determined by the latitude of the observer. It must be parallel to Earth's axis and point North.



In this sketch the observer is assumed to have followed a star across the heavens. Note how tube has shifted around polar axis.



Home Filing Cabinet

Family business will naturally center about this useful piece.

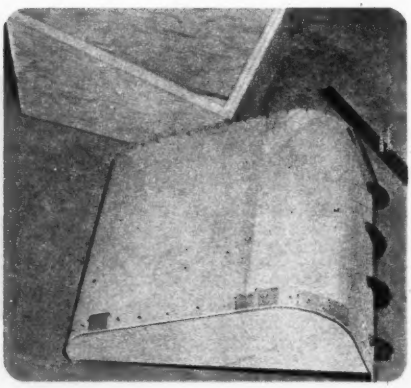
By M. C. Anderson

IF you are one of those persons who have "more business than a cranberry merchant," you will find this cabinet one of the most useful items of furniture in the house. Built from plywood in modern style, it is decorative as well as functional. The original was finished in walnut, however any finish may be used to match other furniture. The box will take standard 8½x11-in. stationery, but standard sized index cards must be cut down slightly to fit.

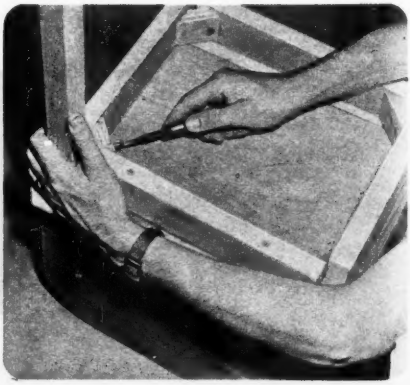
The box is built from ½-in. birch-faced plywood with the corners mitered as shown. All joints should be secured with glue and finishing nails set below the surface and puttied over.

Frame the lid from ½-in. plywood and ½x1½-in. strips. Birch aircraft plywood, 1/16 in. thick, was used to form the original curved top. A sheet of veneer may be substituted if desired. It may be necessary to soak the material for a short time to facilitate bending. Beginning at one end and working slowly toward the other, attach it to the frame with casein glue, which will adhere even when the material is wet. It is held in place while drying by clamps and brads. The latter are not driven all the way down.

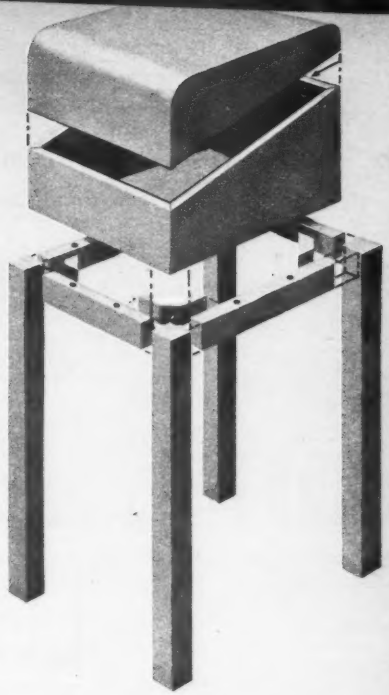
When the glue has thoroughly dried, remove the brads, fill the holes, sand the entire box, and trim down any excess material with a small block plane. The lid is fastened to the box with two small brass



Glue the curved plywood cover to side pieces. Small nails, blocks, and C-clamps are used to hold the plywood in place while the glue sets.



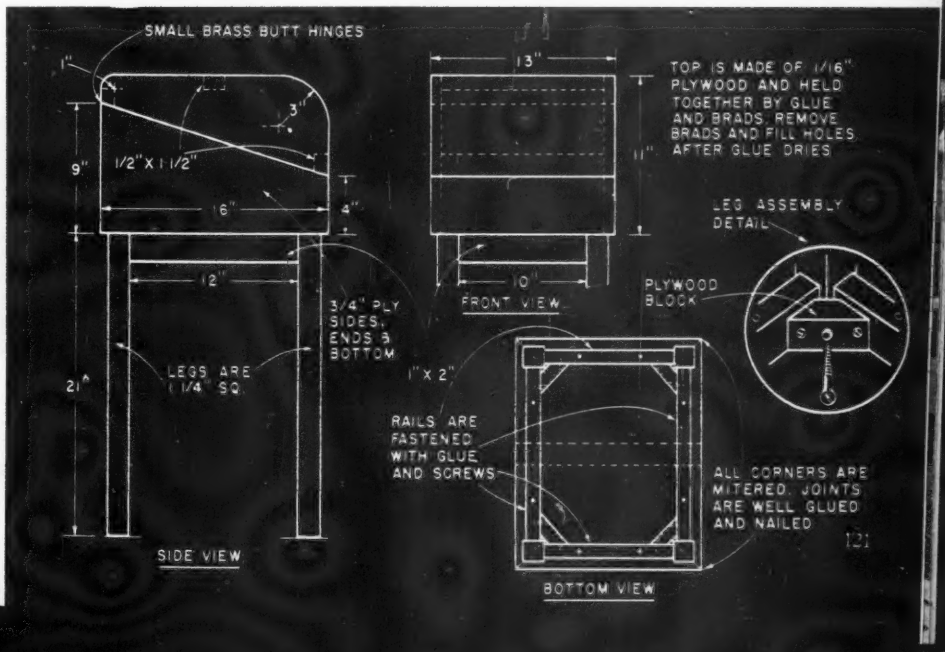
Rails screwed to bottom of the box and plywood corner blocks lend sturdy support to the legs. Attach each leg to the box by a single screw.



butt hinges set flush with the surface.

The method of securing the legs is sturdy and permits their easy removal when necessary to move or store the cabinet. Fasten the rails to the bottom of the box with glue and screws; then attach the plywood corner blocks. These blocks are bored to take the screws that hold the legs in place.

Stain the completed cabinet as desired and finish with shellac and varnish, sanding with a fine grade of sandpaper after shellacking. No handle was used on the original cabinet, the file being opened by grasping the side of the lid and lifting. However, a small drawer-pull may be added on each side if you wish. And you might as well make two of these files—the lady of the house is sure to want one. •



PORTABLE CRIB

When Junior goes on a trip, take this crib along—it'll prove indispensable.

By Bill Cartwright

Baby is going to visit Grandmother; so Mamma knocks down his portable crib, above, and Dad tucks it under one arm, below, and heads out the front door to set it up in the family car.

ANY parent who has ever traveled with a fairly young child—or left the baby at a grandparent's home for the night—knows the value of a good-sized portable crib. This nearly full-size, completely portable crib can be carried about easily, can be set up or taken down in an instant, and will provide accommodations for the child in your car or at home as needed. Last but not least, it can be built with hand tools in about eight hours.

Before proceeding, check the dimensions of the automobile's back seat to make certain the crib will fit properly. The dimensions given in the accompanying drawing can be modified if necessary. When the proper dimensions are established, cut all materials to size and sand down. The next step is to mark the positions of all the hinges and cut insets with a chisel so they won't

extend beyond the surface of the wood.

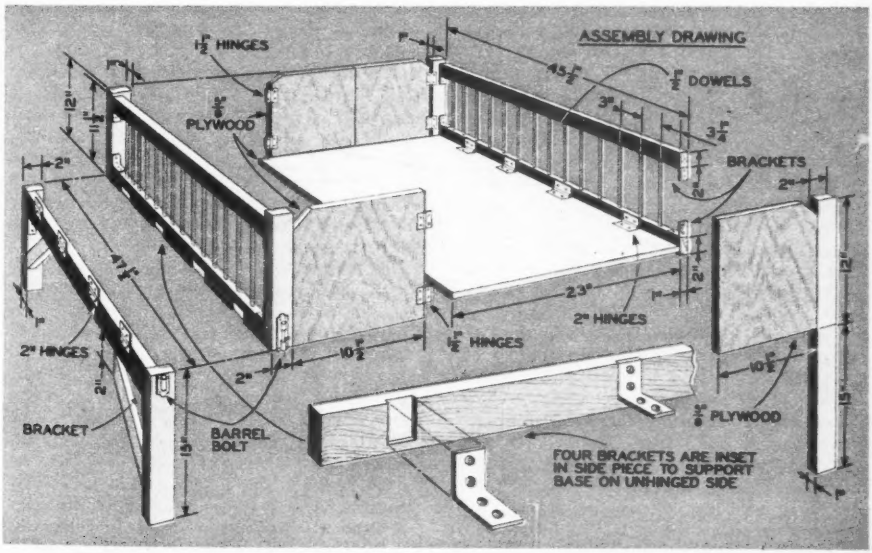
After the insets for the hinges are cut, take one pair of side rails and clamp them together in a vise. Beginning at a point 3¼ in. from one end, lay out for the dowels on 3-in. centers. Using a doweling jig, bore ½-in. holes to a depth of 1 in. Lay out the second pair of side rails in a similar manner and again bore for the dowels. From ½-in. dowel stock, cut 28 pieces 9½ in. long.

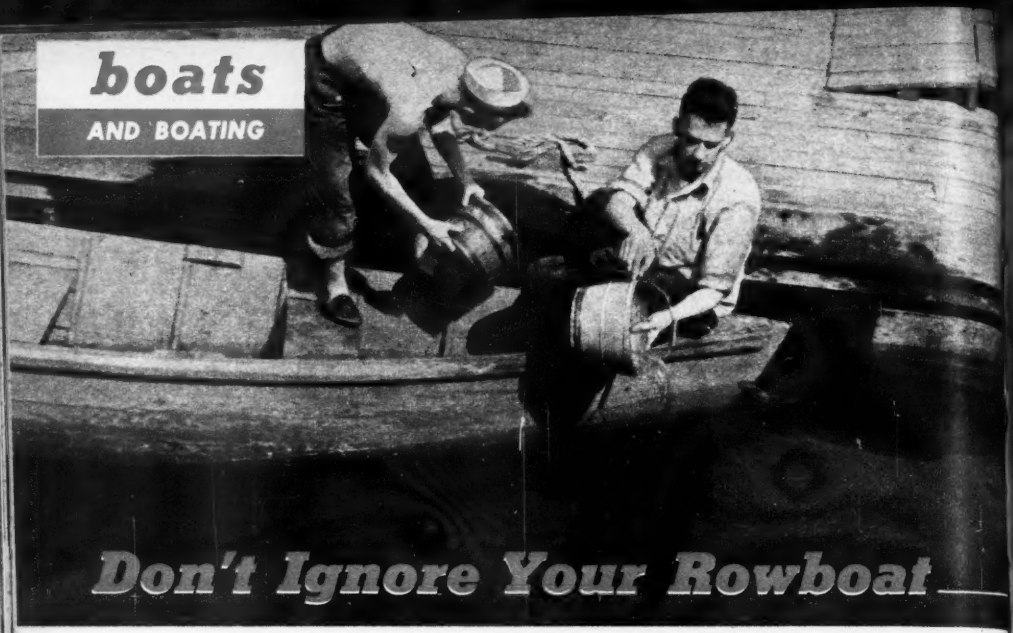
Commence assembly by attaching the two barrel bolts that hold the pair of folding legs rigid. It is best to use bolts about 3 in. long, and to get ones that have snug-fitting bolts and barrels so the utmost rigidity is provided. When this has been done, hinge the end sections together, making certain that the hinges are on the outside. Next, connect the ends to the legs with hinges on the inside surfaces. Follow this by attaching the plywood bottom of the crib with hinges to the bottom rail on the side that will have solid legs. On the opposite bottom rail, install four angle brackets, making sure that they are the proper height to support the bottom in a level position.

Attach the bottom rails to the ends, using angle brackets for the purpose. Place the dowels in position (employing glue to hold them firmly if they don't fit snugly in the holes); then drive on the top rails and secure in position, again using angle brackets. This completes the assembly.

The crib may be stained or painted, but should in either event first be given at least one primer coat and preferably two. If painted, make certain that a paint without a lead base is used. This is the only type that is safe for use on children's toys and furniture on which the kids might suck or chew. The easiest way to add further decoration to the crib is to use decalcomanias. The sides of the crib may, if you so desire, be made higher, the better to hold the child; but the specified height is quite satisfactory, especially if a crib harness is used to anchor the child in place. •

After Dad puts the crib in the back seat, Mamma tucks little Baby away, snug as a bug in a rug.





Don't Ignore Your Rowboat

By Elon Jessup

DID you waste too much of your time this past summer arduously bailing out your boat like the two fellows at the head of the page? That isn't a very profitable way to spend your vacation. Bigger boats usually receive the attention they deserve—even canoes get their share of consideration—but the average rowboat is too generally ignored. And this despite the fact that it is normally subjected to more hard use than almost anything else afloat.

It's sometimes held that—as Mark Twain said of a few fleas in respect to a dog—a little leaking is good for a boat. This may be true—it's obvious that any wooden boat will leak if it has been out of the water for quite a while. But you expect it to close up tight as a jug after a reasonable amount of soaking. If it doesn't, something's the matter. It might be a good idea to keep a record of your bailing time and then figure against this total the probable amount of time and effort it would take to stop the leak. The result might surprise you. In plenty of cases, so simple a cure as a coat of good marine paint may be all that is needed. But in any event the repair of a rowboat is essentially a simple job.

As an example of an easily made repair, look at a metal rowlock socket. Probably you never gave it a thought, but this insignificant fitting is constantly exposed. Water seeps in at the joint between it and the wood in which it is set—and stays there. In time the wood rots and one day, when you put a little extra pep into a stroke, the fastenings let go, causing the entire socket to give way. Unless you're good at sculling, you may find yourself in a bad spot. How much simpler it would have been to install new fastenings or new wood beforehand.

Then there was the time a friend of mine grabbed the forward seat of his boat, intending to beach her, and gave a stout haul. To his embarrassment, he went on his neck as rusted fastenings let go and the seat came away in his hand. Now the seats in a rowboat are important, for in addition to being something to sit on they also serve as a means of holding the hull together; so one of the most effective ways of stiffening up a hull is to reinstall a loose seat.

In the average rowboat, the seats are either attached to stringers that run the length of the hull or fastened to cleats, called risers, which in turn are secured to the hull. Sometimes you'll find further bracing at the ends of the seats in the form of wooden hanging knees or metal suspension rods. Usually there is also a brace under the center of each seat, running down to the keelson.

To brace a seat so it holds a boat solidly together, follow the procedure demonstrated in the accompanying photos. Use two pieces, which should be as wide as

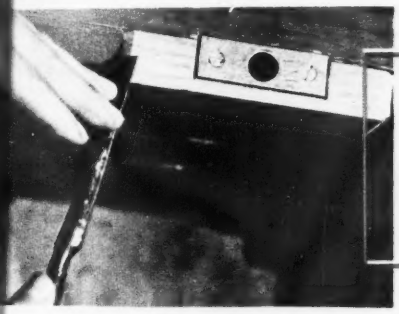
the seat itself and as long as the height of the boat's side, to reinforce the side planking. Screw them to the planking, driving some of the screws from outside the boat and some from inside. On each of these two backing boards, draw a line where the bottom of the seat will come; then screw on strong supporting cleats.

Cut the seat so it is about ½ in. shorter than the clear distance between the two backing boards and secure it by sinking screws vertically through the ends into the supporting cleats. If you finish by adding a center support from seat to keelson, it will be a long, long time before the seat will again loosen up.

The three parts of a hull that take the worst beating are the stem, the gunwales, and the corners formed by the sides and the transom. The stem, being hardwood, can take care of itself. As for the gunwales, you can fasten on standard guards, made of rope, canvas, or rubber. But the stern corners are a problem. They are easily banged up and after they've been mistreated a while a leak is likely to start. To ward off hard knocks and at the same time strengthen the stern, bend a sheet of copper around each of the corners and fasten it down. For a particularly neat job, first cut rabbets in the hull so the copper will lie flush with the surface.

A rowboat is subject to pounding and scraping on the bottom, too, which is why there is a keel down the center. You can augment this with two additional rub strips running along the chines.

When an outboard motor is used, strength in the stern is especially important. Many rowboats weren't built to carry a motor. If yours is such, install knees at upper corners of the transom. •

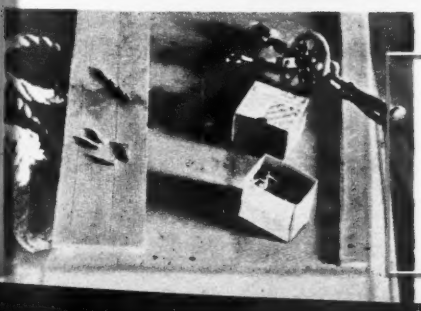


Left: Finishing off a new support block for rowlock socket.

Right: Underside of a strengthened seat showing the cleats.

Left: Fitting a new seat is easy if you follow instructions.

Right: To guard the corners of transom, apply copper sheets.



Left: Rub strips at the chines mitigate impairment of hull.

Right: Use quarter knees to strengthen transom for motor.

Boats will be built this winter in any convenient place—cellars, vacant lots, and garages all have their exponents.

Building a Boat this Winter?

By William F. Crosby

THIS is the time of year when many amateurs are planning to build new boats for use next summer. Some of them, unfortunately, will find that they have bitten off considerably more than they can chew. To avoid being one of the latter, carefully read what is to follow.

In the first place, if you have never before built a boat don't start off with an elaborate cruiser or auxiliary. Instead, pick something smaller and simpler on which to learn the fundamentals of the art. Because it must be watertight and strong—factors requiring careful workmanship and plenty of patience—no boat is easy to build. Unlike a bookcase or birdhouse, a boat is made from the heavier and harder woods. Joints between keel members, stem, deadwood, and similar parts require precise fitting. And lining up an engine, boring for the shaft, and the thousand-and-one other jobs take plenty of time and call for careful planning.

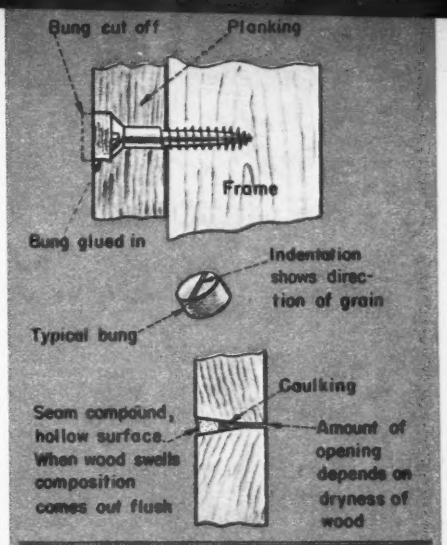
Waterproof plywod has eased the amateur's task because it does away with a lot of seams that must be made tight. A large sheet of plywood may be put in place, covering a large portion of a side, in no more time than it would normally take to cut and fit one ordinary plank. However, plywood is queer stuff to handle. It can't be bent around any old set of frames because, like any other sheet material, it won't go in two directions at the same time; so if you want a plywood boat make sure that the design you choose has been planned for plywood planking.

There is one very important thing about which every prospective boat-builder should be warned—*don't make changes in a design!* The designer has

made many involved and careful calculations to make sure that the boat will float squarely on its designed waterline and perform satisfactorily. If a design calls for an engine amidships, don't put it in the stern. If a plan shows an outboard motor, don't install an inboard. Put fuel and water tanks, cabins, icebox, and so on exactly where they are depicted on the drawings. If you should shift these weights around, all your winter's work may go for nothing.

In sailboats, the locations of the sails and keels or centerboards have been figured out to give best results. If you make your sloop into a yawl, you may throw all the designer's calculations out of whack and wind up with a boat that has a terrific weather helm. If a centerboard is called for, don't change to a keel. An actual instance is recalled where a plan specified a keel and the builder substituted a centerboard, forgetting all about the outside ballast. He cussed the poor designer out when his boat capsized on her maiden voyage.

Then there is the matter of materials. Good lumber is still hard to get and lumber-yard [*Continued on page* 140]

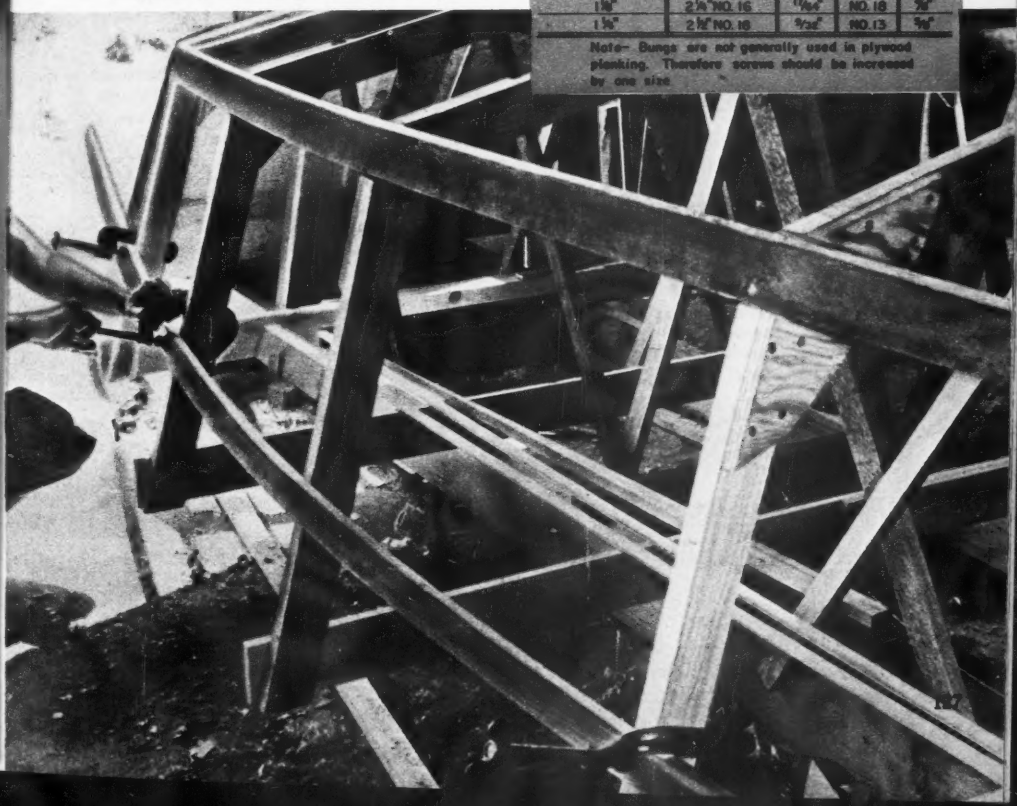


SCREW SIZES FOR BOAT PLANKING

THICKNESS OF PLANKING	LENGTH AND GAUGE	BODY DRILL	LEAD DRILL	DIAM BUNG
¼"	½" NO. 6	1/8"	NO.47	NONE
3/16"	3/4" NO. 7	9/64"	NO.44	NONE
½"	1" NO. 8	9/32"	NO.40	NONE
5/8"	1¼" NO. 9	11/64"	NO.37	3/8"
3/4"	1½" NO. 10	3/16"	NO.33	½"
7/8"	1¾ NO. 12	13/64"	NO.30	5/8"
1"	2" NO. 14	15/64"	NO.25	5/8"
1¼"	2¼" NO. 16	17/64"	NO.18	3/4"
1½"	2½" NO. 16	9/32"	NO.13	7/8"

Note- Bungs are not generally used in plywood planking. Therefore screws should be increased by one size.

Here abuilding is an 18-ft. auxiliary sloop. It's typical of the many available MI plans.



car care

Below: A light oil applied to the shaft of the windshield wiper will help assure reliable action. Lubrication at this point is usually overlooked.

Ignition condenser failure is sometimes due to a break in the pigtail wiring within the distributor. This breaks the circuit and damages the condenser which, in turn, may cause the breaker points to burn.

An oily radiator suggests a cylinder head gasket leak or a cracked head or block. An emulsifying rust inhibitor does not settle out and should not be assumed to be the explanation for the appearance of oil in the water.

New breaker points, plugs, a ground strap and battery cable will do wonders toward improved starting.

Wheel cradle shown below lessens possibility of car rolling off a bumper jack. "NoRol CarBlock" is made of aluminum and folds up when not in use.

Don't be alarmed if a little air seems to escape from tire when you jiggle the valve stem. Slight air pressure may build up between tube and tire.

BEHIND THE WHEEL

With Fred Russell

What causes my 1939 Chevrolet to groan when I apply the brakes? M. Magliozzi, Cincinnati, O.
The noise you hear when stopping is due to the vibration of the brake shoes. They are not adjusted properly or possibly the linings need chamfering.

Can I fit my 1947 Oldsmobile with the new "super" tires? How will they affect gas mileage and performance? Glen Pigg, Paintsville, Ky.
The change can be made. Tests seem to indicate that they do not consume more gas; however, you may have a bit more sway on curves.

The rear wheels on my 1946 Plymouth toe in. The car has never been in a wreck. What caused this condition? H. R. Gipson, Salt Lake City, Utah.
Rear wheel misalignment is usually due to some strain on the housing, frame or springs. Bent parts should be straightened cold, not heated.

What was the date of the first American-made motor car? Mathew J. Krinks, McKeesport, Pa.
The Duryea, made in 1894.

What causes my 1940 Plymouth to buck and skip at about 20 mph? Bill Inglis, New London, Conn.
Skipping may be due to an incorrect spark plug gap. Also check for an air leak around the intake manifold. Any chance of the valves sticking?

Would it be practical to install a 3:1 rear axle in my 1939 Pontiac? At present I have a 4.6:1 axle. James Reilly, Joliet, Ill.
I don't recommend a higher rear axle ratio; the engine just would not stand it. Gas mileage would be low because you'd be forced into second gear quite often.

Would you recommend the purchase of a 1926 Willys Knight? This car has been out of service for about 10 years and has been properly stored. Has it a good engine? F. W. DuPras, Eustis, Fla.
Forget it. You cannot get parts for this car unless you had access to a machine shop. The Knight engine had many advantages but it did burn oil. In fact, at one time, such cars were barred from Philadelphia parks because they smoked so much.

Can you give me some information on auto painting? C. J. Andes, Columbus, O.
Write to the Finishes Department, E. I. DuPont de Nemours & Co., Wilmington, Delaware, for their free booklet about DuPont lacquers.

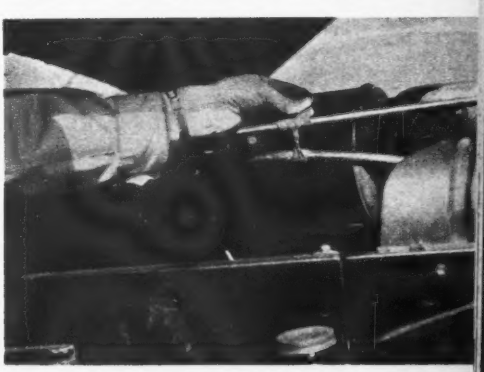
The rear ends and transmissions of some cars use the same grade of lube in winter as in summer, but don't overlook the benefits from a fresh filling.

Keep the gas tank filled as a safeguard against condensation and water in the fuel.

The clutch pedal should have about an inch of free play otherwise it will wear abnormally in traffic or when pulling out of snow banks.

Sluggish action when the engine has warmed up, but not while cold, may be due to insufficient tappet clearance.

Below: The hose leads for the heater should be taped to supports in order to prevent them from sagging and touching manifolds or engine block.



An unusual body squeak may be caused by the rubbing of gas tank filler pipe against the fender. Check by replacing rubber grommet with new one.

Below: Chipped paint is often the beginning of serious corrosion, especially when it occurs at the bottom of the door panels or running boards.

Monthly Photo Contest

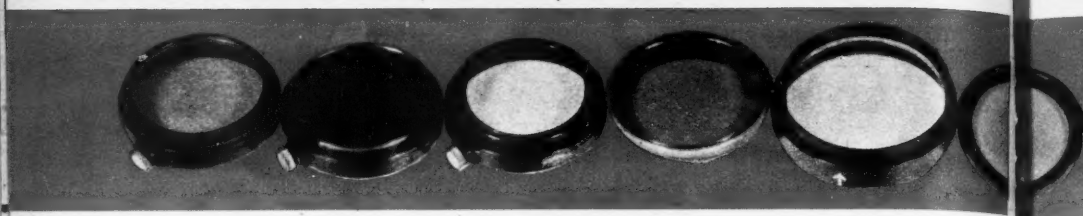
First Prize.....The Gibson Boy W. G. Chandoha of Astoria, N. Y., receives $10.00 for the photo on the opposite page. Taken with a 3¼x4¼ camera.

$5.00 Award.....Lunch Albert Von Trott of Philadelphia captures an overgrown house cat in a hungry, angry mood.

$5 Award..Moonflowers An exquisite study by G. W. Murray of Colorado Springs. Graflexed on Super Pan Press film.

"Grandfather's Clock" by Addison Gilbert of Deland, Florida, takes the third $5.00 Award. Taken on Verichrome.

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address: Monthly Photo Contest Editor, MECHANIX ILLUSTRATED, 67 W. 44th Street, New York 18, N. Y.



WHICH FILTER?

A glass disk slipped over your camera lens may transform a snapshot into a picture worthy of exhibition at a salon.

This picture was taken with a green filter and pan film This brought out the clouds without darkening foreground.

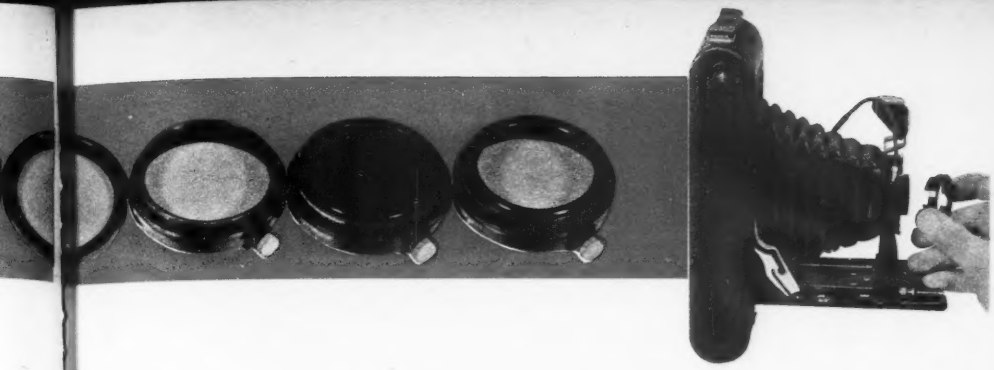
Below: The use of a red filter will also permit clouds to register, but note forground. It is much too dark.

HOW would you like to turn sunlight to moonlight, take a fog picture on a clear day, or put clouds into an otherwise bald sky? You can do it and very simply too. Just use the proper filter.

As a rule most amateur photographers think of filters only when they want to dress up a landscape with some fleecy clouds. Filters, however, are much more versatile than that. They can also produce fog, lend a fairylike atmosphere to your favorite glade, and take the wrinkles out of Aunt Martha's face. All of this and more too, through the medium of a piece of gelatin, glass dyed in the mass, or gelatin cemented between glass—the forms in which most filters are supplied.

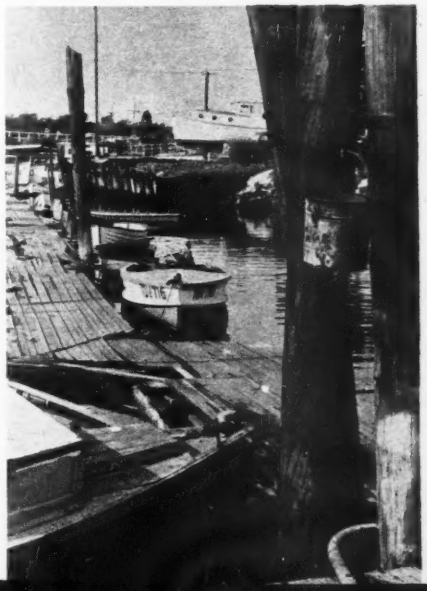
In addition, we have fog filters. These can be best made yourself to suit your own needs. A piece of gauze or a bit of silk stocking stretched over a frame will produce an unusually effective professional result.

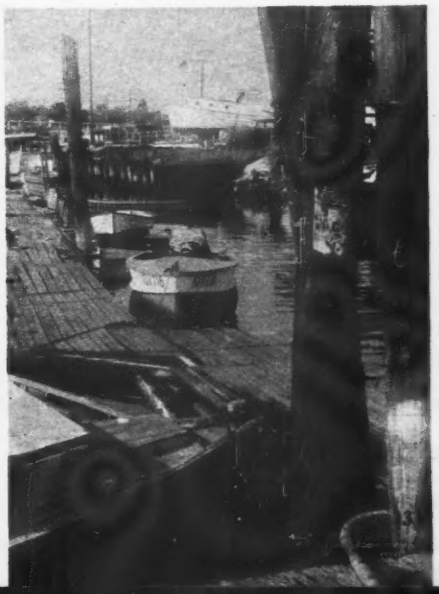
The most commonly used filters are the red and yellow ones; both will hold back the blue in the sky in order to give the clouds a chance to register. If you are a country dweller you will find that a light yellow filter is all you need to bring out clouds. Your city cousin on the other hand, will find it necessary to use a red filter in order to achieve the same result. This is so because of the heavy concentration of dust and smoke found over our large cities. If you use a red filter when taking a landscape you will [*Continued on page* 137]



Above: A shot taken with a sky filter does not require any increase in exposure. Only top half of filter is yellow. Note how clouds registered.

A straight shot is shown below, at left. Picture at right was taken with a diffusion disk. This achieves a pictorial effect by eliminating crispness.





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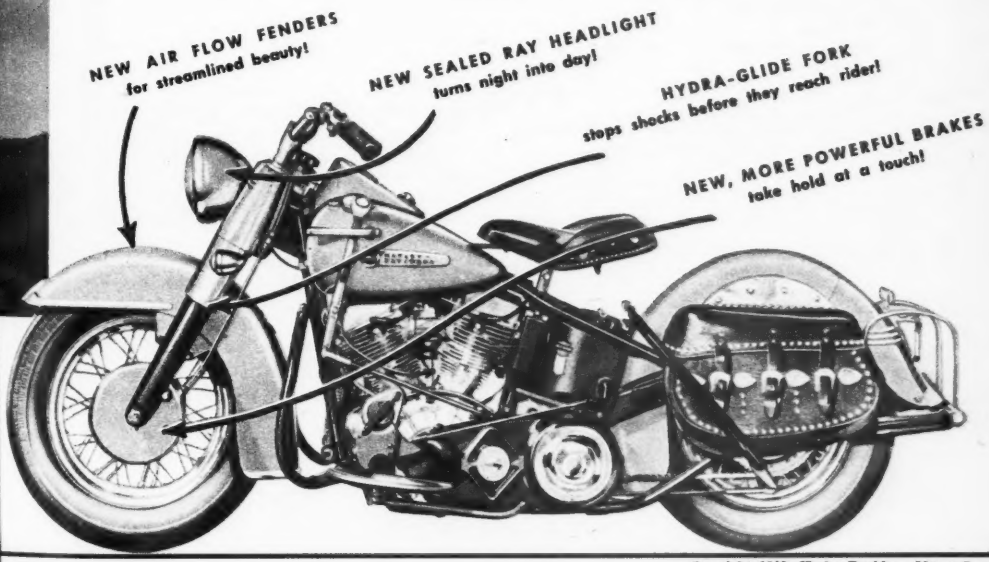

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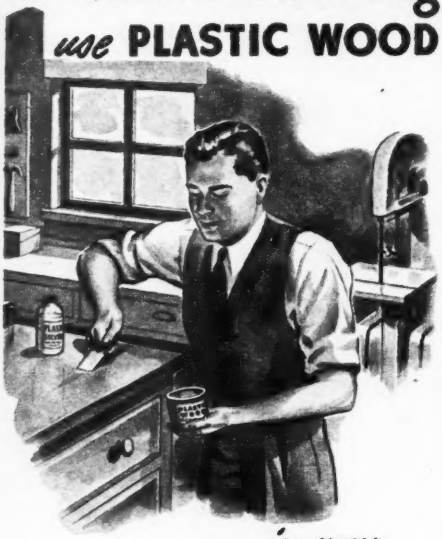
For Cabinet Finishing use PLASTIC WOOD



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PLASTIC WOOD

Tube or Can

Hornet 3

[*Continued from page* 113]

dowels (two on each pontoon) to make a snug fit. Drive in the dowels and clamp, using scrap wood between clamps and hull. If you have trouble using clamps on angled surfaces, ten feet of ¼-in. flat model airplane rubber will do the job. Merely wrap it around a few times.

Trim the pontoons to fit the sides, cut down the nose block and lay out the forward deck. Cut out the deck and glue in place. When set, drill through the plywood bottom and keel for the shaft. Insert the tubing, mount the strut and engine mount assembly. Make the shaft tube plate and then cut the shaft to length and install. After the plate is screwed in place, and the tube lined up, solder the plate to the tube. Remove the strut, shaft, and engine mount assembly before painting.

Paint the hull your favorite color enamel and then apply several thin coats of clear Dupont Automotive Dulux. Give the inside several coats of Dulux or thinned-out Weldwood glue.

Mark on the forward deck the position for holes in the aluminum piece as noted. Drill and tap the 6-32 holes and then mount the forward tether aluminum strip. Install your engine, tank, strut and shaft. Mount the coil and batteries, which should go all the way back. Ready to run, the boat should balance about five and a half inches back from the step. Make the forward metal deck over tank from thin aluminum and fit the rear deck with a hatch or opening to change batteries.

The tether should be a 35 or 52 ft. of $\frac{1}{16}$ in. aircraft cable. The center post usually consists of a length of 1½ in. diameter pipe extending about 3-5 ft. above the water and fitted with a ball bearing swivel. Although you can mount your post on a floating buoy it is best to run in a pond sufficiently shallow to permit a permanent center post installation. A sunken concrete slab containing a T fitting is recommended.

The rear tether piece is fastened with one of the strut screws and one other bolt through stern. Make the steel wire bridle and hang boat up by the bridle. Bend the tether mounts so boat hangs level. For your first run, use a two and a half inch diameter, five-inch pitch prop. Launch the boat with a good push, keeping the nose up. If boat raises too high in the front, adjust thrust line so strut has a slight positive angle. Remember to loosen engine coupling and then tighten again. If front of boat dips down too much, adjust the strut for slight negative angle or move weights toward stern. The boat should ride level. For lateral adjustments bend tether mounts up or down. Make sure strut shaft has a little end play and oil strut and shaft tube before each run. •

WHICH FILTER?

[*Continued from page* 132]

find that the foreground has been darkened so that little detail is evident. We have sacrificed half of the picture in order to enhance another half, the top. You can get around this catastrophe by using a green filter. A green filter, as you can see from the examples on page 132 will not only allow clouds to show up but will also permit sufficient detail to print through in the foreground.

Another handy gadget is the sky filter. This filter does not require any increase in exposure. The upper half of this filter is graduated into a medium yellow to hold back the blue. This permits foreground detail to register. It is a pity that this filter is not more generally employed as it is practically foolproof for the average amateur.

The diffusion disk is quite often used to lend a soft and pleasing quality to an otherwise critically sharp landscape. When it is combined with a portrait attachment it is called a portrait diffusion disk.

Fog filters, as indicated previously, are merely bits of gauze or silk stretched over a suitable framework. If you have an old filter which is badly scratched it is worth while removing the glass in order to make your own fog filter. The two pictures on this page show the same landscape taken with and without such a filter. A fog effect should not be confused with an out-of-focus shot. Such a picture is usually very trying on the eyes and does not exhibit the solidity about which the fog effect seems to swirl.

Another interesting filter is an infrared filter. It is used with special infrared film. With this combination, the sky will appear black and if any clouds are present, they will register as pure whites. The overall effect is very dramatic and unusual.

Never under any circumstances use a filter designed for black and white film with color film. This may be a rather obvious statement to make, but the writer has time and time again come across weird, sickly looking Kodachromes—the result of exposure through a yellow filter.—*Robert Brightman.*

Fog. This stunt, borrowed from Hollywood, calls for a piece of gauze stretched over a frame. The degree of fog is determined by the closeness of the mesh.

When in doubt, take the straight shot below as often you can get the result you are after, in the darkroom. Just slip a fog filter over the enlarger lens.

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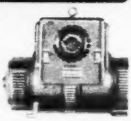

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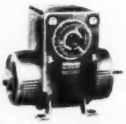

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Polishing Metal

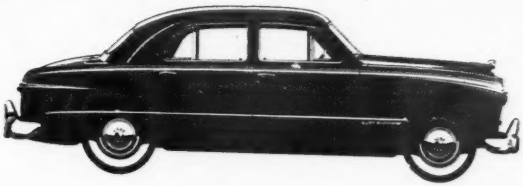
[*Continued from page* 107]

buffing of copper, brass, aluminum and pewter. We are not concerned about these cutting abrasives around the house, for the articles to be polished will usually already have had a smooth finish and require only the final buffing to bring them back to new.

Abrasive compounds are not used for the final polish. The compounds have a burnishing action. They smooth over the minute unevenness of the metal by gently pushing and flowing the metal from the high spots into the valleys: Of these, so-called white rouge gives a glazed finish to the white metals (aluminum, nickel, chromium, steel, and brass). Red rouge, jeweler's grade, will impart a high luster to the costly metals; silver, gold, platinum, etc.

Electropolishing is a new method of polishing metals, in which the electric current does the work quickly and silently, without aid from buff or polishing compound. So efficient is the method that it is now used by the Oneida Community to impart the high polish seen on their silverware, and by the American Rolling Mill Co. for stainless steel polishing. With electropolishing, all the hard-to-reach surfaces are polished as easily as the remainder of the work. The process is the reverse of electroplating. The work is suspended in an electrolyte from a wire which is connected to the positive side of a direct-current source. A sheet of plain metal is likewise suspended in the solution, opposite the work, and is connected to the negative side of the power source. The latter can be an ordinary storage battery. From 6 to 12 volts are generally used, with about 1 ampere per-square-inch of work surface. The current is applied intermittently, for up to a minute, until the work is sufficiently brilliant.

A glass container should preferably be used so that progress of the polishing can be noted. The work should be smooth and well cleaned. For polishing silverware, an ordinary cyanide (poison!) electroplating bath is used. A suitable formula consists of 6 oz. sodium cyanide dissolved in a gallon of distilled water. Add 3 oz. silver chloride and when it is also dissolved, add 6 oz. sodium carbonate. The cyanide content makes it necessary to handle this electrolyte with care; do not breathe any fumes, wear rubber gloves, and never add any type of acid to the liquid. For stainless steel, use 70 oz. citric acid and 20 oz. sulphuric acid, slowly adding them to sufficient water to make 1 gal. (Never add water to sulphuric acid!) In this formula, citric acid can be omitted and phosphoric acid substituted to make an electropolishing solution for carbon steel, aluminum, brass, copper and some alloys. It may be necessary to dilute the solution with more water for best results with some alloys. •



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The Car of
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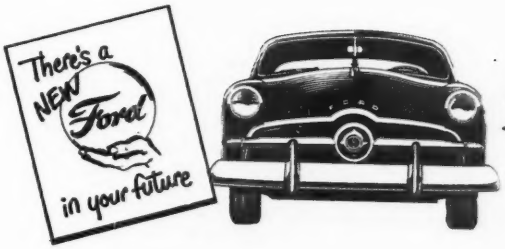

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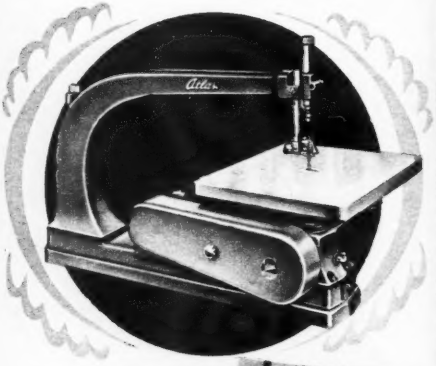

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Atlas — Power King

MATCHED PRECISION TOOLS FOR MACHINING AND WOODWORKING

Building a Boat?

[*Continued from page* 127]

operators, as a rule, don't know anything about boats; so pick carefully. If you can't get the best material, don't settle for second-grade stuff. It's better to wait until you can get the right lumber than to rush ahead on your boat and find that the planking, for instance, twists and warps all over the place.

When planking with ordinary lumber, the amount of opening left between strakes depends on the amount of moisture in the wood. The wetter the wood, the more closely the seams should be set. In extremely dry wood, seams should be left fairly wide open so they can be caulked and filled with seam compound. No one can tell you *exactly* what amount of space to leave; so, remembering the above general rule, use your own judgment.

Plywood edges should not be left exposed, but should be covered with some other kind of wood. Modern marine glues may be used with great success if applied in exact accordance with the manufacturer's directions. A boat built from plywood using waterproof glues must be put together in a well-heated room as these glues won't work in temperatures under 70°. On the other hand, a boat that is planked up should be built in a cool place or the wood will dry out too much.

These are just a few of the points to be considered when you build that "dream ship," but don't forget—don't change the plans or you may be a very, very sorry builder. •

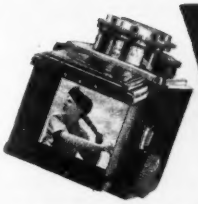
Telescope Makers Page

[*Continued from page* 119]

we mount our telescope *equatorially* only one motion will be required to follow a celestial object once the telescope has been sighted on it. To do this, the vertical axis must be inclined so that it is parallel to the axis of the Earth.

The motion of the tube up or down is called *declination*. The motion around the *polar axis* is called *right ascension*. After the star is located in the eyepiece all you will have to do is rotate the entire instrument around the polar axis to compensate for the movement of the Earth. It does not matter if the telescope is pointed directly overhead or near the horizon. Just turn the entire telescope, declination axis and tube as a unit around the polar axis and the star will always be in the field of view. •

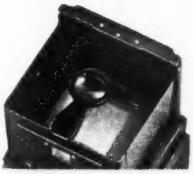
Plans for building MECHANIX ILLUSTRATED'S Portable Six-Inch Telescope are available. Please send $2.00 and your request for P-5 to MECHANIX ILLUSTRATED Readers Plan Service, Fawcett Bldg., Greenwich, Conn.



You won't miss with the big, unusually brilliant ground-glass view finder —you see your picture as you take it.

You catch fast action shots when you convert the focusing hood to open, eye-level frame finder.

You get exciting flash pictures with accessory Kodak Flasholder—shutter has built-in synchronization.



You focus to a hair with the magnifier set into the finder hood—handy for critical close-ups.

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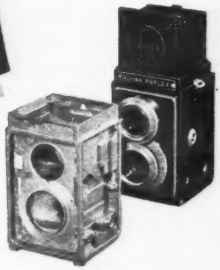
More features for your money in this fine "reflex"

Look at all you get **with the Kodak Reflex Camera. It's the camera that won't let you miss—2¼ x 2¼ sparkling black-and-white pictures or 2⅞ x 2⅞ Kodacolor Prints.**

You check all settings quickly—depth-of-field scale, lens and shutter speeds—plainly marked and easily adjusted.

You have wide range of operation—twin Kodak Anastar f/3.5 *Lumenized* Lenses; 7 stops from f/3.5 to f/22; 7 speeds from 1/2 to 1/200 second.



You're up-to-date with modern reflex styling and rugged, die-cast aluminum construction.

Smart Field Case included with camera. Price $120 plus tax; Flasholder, $9.50 plus tax. Your Kodak dealer has yours in stock now.

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Colonial Table

[*Continued from page* 118]

bolts and tighten. Leave in the clamps for about ten or twelve hours.

Next, stand the feet and end posts, which are now integral units, opposite each other and insert the trestle tenons into their mortises. Drive home the wedges, which should be cut to size on the spot, for an accurate fit. Incidentally, the wedge mortises must penetrate the outer sides of the end posts for about a quarter of an inch; this allows plenty of takeup on the wedges so they will bring the end posts real tight against the trestle tenon shoulders. If they have been properly fitted, the assembled sections will now be as solid as a rock.

Clamp the cleats in position across the tops of the end posts and drill for the three carriage bolts in each that hold these parts together. The reason carriage bolts are used here is that you may want to move the table sometime; by removing the six bolts the whole top may be lifted off. Then, by knocking out the trestle wedges you have the whole table apart in four pieces; top, trestle and foot posts. Putting it together again takes about five minutes. This makes the table not one whit less rigid, as you will see, and is a very desirable feature.

Having bolted the cleats in place, the next thing is to drill the four vertical holes in each cleat through which lag screws will secure the top. Center the holes, and space them equally from the middle; exact measurements are not important. The main thing is to get them so the 4-inch and 5-inch lag screws will project about one inch. In other words, they will drive one inch into the wood of the top.

Clean shavings out of the holes, and with the assistance of a friend, lay the top in place. Check it carefully for centering, both at ends and sides. Now get on your back underneath the table and drill carefully up through the lag screw holes into the top, using a bit of slightly smaller diameter than the lag screw threads. Don't drill too deep or else you will run clear through the top and have a hole to fill. Without moving anything, put the lag screws in and tighten with a wrench. Go around the eight screws as though you were putting on an engine head. When all is tight and the top is snug, come out from under—your table is finished.

Finished, that is, except for the finish. And, of course, plugging those bolt holes in the feet. Use regular boat deck plugs for this, of a matching wood, or cut them yourself from waste stock. The size will depend on the size of your countersunk holes, probably ¾ in. Set them in glue or shellac and trim off flush with the wood surface later.

The actual finish is largely a matter of preference, and also depends upon what type of wood was used.

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Low-Cost Marlin .22's

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18-25 shots on one loading
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Shooting efficiency, with *least* fuss and bother! Magazine holds a load for a full day's hunting. Patented non-jamming feed. Shoots .22 short, long and long rifle cartridges—regular and high speed without adjustment. Quick-release trigger—self-cocking action—side ejection—Off and On safety—American walnut stock. Available with peep sight or open sights; sling strap swivels.

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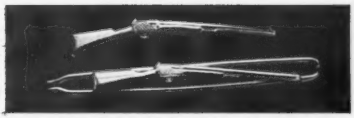

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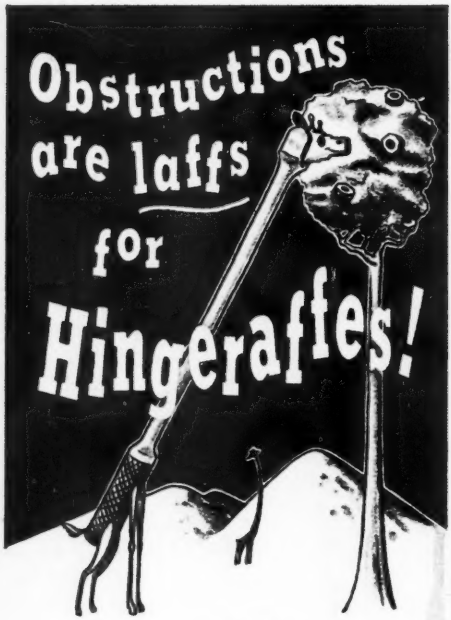

. . . and all the rest of his big tribe of socket wrench handles and attachments—designed to turn nuts quickly and easily in hard-to-get-at places. As knuckle-savers, they're worth their weight in skin, so buy these tough, long-lasting attachments from your dealer now. He's sure to have the ones you want because

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My Workshop

[*Continued from page 87*]

start a hobby workshop, too. But I just haven't got the money."

Actually, you can start a workshop for as little as $50. It's nice to have more than that, but $50 will cover two of your three essentials: space and equipment. The third essential, of course, is customers. If you need advice, I can give you that.

Right now, space will be your toughest item. I've found that by combing side streets, you may find an old store, a loft or a basement that'll serve the purpose. If it's run down, the landlord will almost certainly give you a break on the rent if you offer to make repairs yourself. With luck, you'll be able to find what you want for $20 a month.

You'll need workbenches. My advice is to build them yourself. An old door makes a sturdy bench top, and scrap lumber does nicely for the legs. Net cost per bench: a couple of dollars.

Then tools. Start with a few basic items—saws, hammers, screwdrivers, chisels, nails, a couple of planes. Buy only what you need at first and add more later out of income. In my shop, one of the first things I did was put up a sign: GOT ANY OLD JUNK AROUND THE HOUSE? BRING IT IN!

I was astonished at the response. There were many men who had tools they were glad to add to the pool. Another source is junkyards; often they yield worn-out power tools that can be made usable with a little ingenuity. You probably will want a sander, jigsaw and a bench drill. I got these by buying them on the installment plan.

Another source of income that I uncovered is making models for manufacturing companies—everything from light reflectors to vending machines. You have to be a competent mechanic for that sort of work, but it pays very well.

During the war I made secret models for the Army and set up hobby shops for soldiers' recreation.

Quite a few commercially successful ideas have come out of my shop already. One is the original baby gym which has sold well all over the country and made much money for the inventor. Others include a shower-curtain holder, a clothes-line holder, the permanent sardine-can opener and a paint-brush holder.

All these inventions were worked out in my hobby workshop. One of them might very well make a million for its inventor.

And if you're looking for a quick million dollars you might just as well stick to the inventing end of the business. Because you probably won't make it out of running your own hobby workshop. But you *can* make a very comfortable living and gain a million dollars worth of real companionship. •

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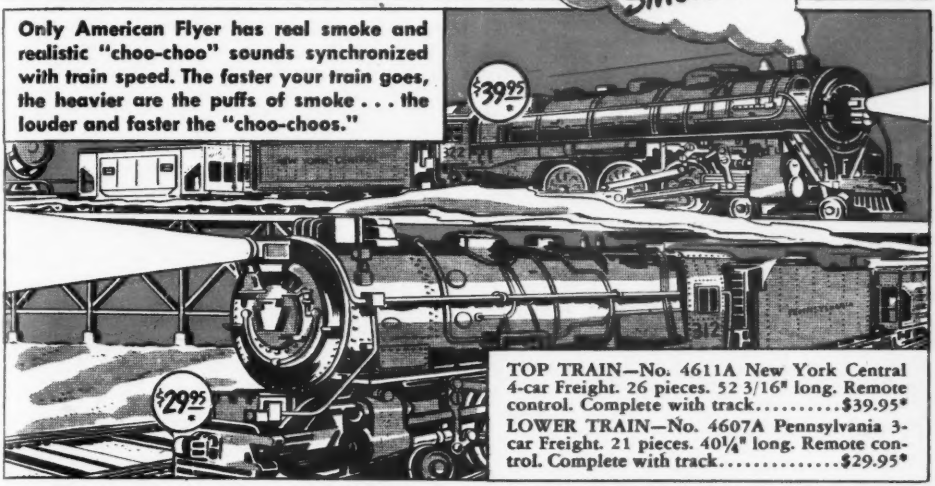
HEAR 'EM CHOO-CHOO

Only American Flyer has real smoke and realistic "choo-choo" sounds synchronized with train speed. The faster your train goes, the heavier are the puffs of smoke . . . the louder and faster the "choo-choos."



TOP TRAIN—No. 4611A New York Central 4-car Freight. 26 pieces. 52 3/16" long. Remote control. Complete with track.....$39.95*

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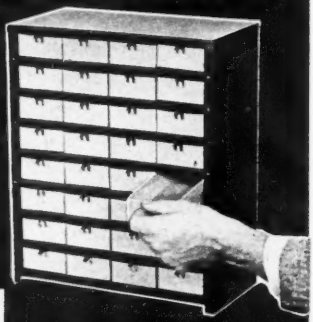

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[Continued from page 12]

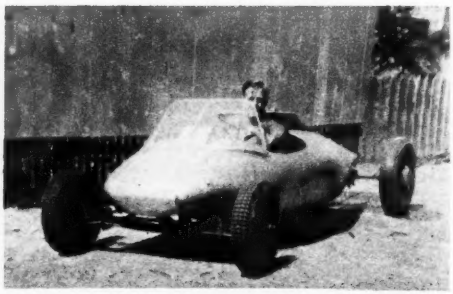
Rear Engine Race Car

Dear Editor:

My two-place, rear engine speedster has made over 100 mph. in actual time trials. The car was built from a 60-hp Ford engine and transmission, a Model T front end and frame-sides, and a 1935 V-8 rear end. This combination makes a very smooth running and easy-to-handle job.

At about 50 mph I get 35 miles to the gallon. The belly tanks used for the body were ordered from an ad in MECHANIX ILLUSTRATED, which I have been reading for over five years.

H. Justin
1102 No. Hart Blvd.
Harvard, Ill.



Mr. Justin has generously offered to provide further information about this nifty racer to any MI reader who writes to him at the above address. Why not take him up on it, fellows?

Here's a Smart Idea

Dear Editor:

I am a regular reader of MECHANIX ILLUSTRATED. After reading each issue I tear out the contents page, paste it in a notebook and then place the magazine on my bookshelf with other issues. This way, I can quickly check my notebook to locate some project I want to try. If I want to refer back to a particular issue, I can find the one I'm looking for right away, instead of having to thumb through all my back copies of MI.

Arthur R. England
2223 Wilding Ave.
Dayton 5, Ohio

Thanks, Arthur, for a good tip which should prove useful to many MI readers.

[Continued on page 151]

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EASY TO USE

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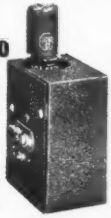

Supplies sufficient power to play records through radio receiver at full volume in other rooms, without wired connections. Oscillator frequency variable between 1350 to 1700 KC. Small enough, 4" x 4" x 2", to go into any standard record player. **$3.49**

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U. S. Secret Weapon?

[*Continued from page* 81]

back to its secret hangar, the shock-torn chart flutters to the floor. Moments later fragments of the enemy's big aviation center will flutter above the blazes as the atomic missiles shatter the target.

Let's hope we are spared from any World War III that can rain down such sudden destruction as we have pictured. But if war does drop from the skies one gloomy night a secret weapon such as this missile-firing dirigible could be our salvation.

Two of the major drawbacks found in former dirigibles—slow speed and high explosiveness—will be absent. Powerful new jet engines can ram a missile dirigible through the air at speeds approaching those of the fastest planes. And those jets can burn non-explosive fuel. Then fill the gas cells with fireproof helium—which is found in quantity only in America—instead of explosive hydrogen, and you have a fast but safe dreadnaught of the skies.

Stout structure and tremendous lifting power will enable the giant airship to carry formidable batteries of recoilless guns and rocket launchers against any attack by air or ground. For further defense against enemy planes, the sky queen packs its own long-range fighter cover in its belly, ready for instant lowering and launching. Our own experience with the Akron and the Macon have already shown that parasite planes are practical for protecting such big airships.

The "big gun" on the jet dirigible, of course, is the atomic missile. In form, it's a cross between the N.A.C.A. Tiamat and some of the ramjet jobs that, fortunately, the Germans developed too late for use against us.

At this stage, rocket power still burns fuel much too fast to do any continent-to-continent bombardment. The ramjet, though, can provide an efficient power plant for a truly long-range controlled missile. As the ramjet whizzes through the atmosphere, air rams into a steel "stovepipe," automatically compresses itself as it moves back into the combustion chamber. Here the heat from the burning fuel expands the air and builds up terrific pressures before thrusting out of the tail end of the pipe in a powerful jet. Theoretically the ramjet has no top speed—it keeps flying faster and faster until it burns itself up or runs out of fuel.

We don't have the atomic-missile airship—*yet*. But our researchers have developed workable ramjets. We know how to build the jet engines and the giant dirigibles. We have the helium to lift the airship and the atom to raze the target. Throw together a few such "secret weapons" and we can win a sudden war—or perhaps even enforce a permanent peace on a weary but jumpy world. •

Moto-Tool

ELECTRIC DREMEL POWER TOOLS

THE "POCKET-SIZE MACHINE SHOP"

A SHOP TESTED TOOL

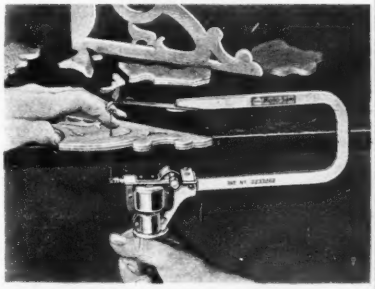
Moto-Tool is backed by over 12 years of industrial use . . . packs years of extra pleasure . . . yet, due to increased production, *pre-war prices still prevail!*

LOOK FOR THESE MOTO-TOOL FEATURES

Oil-less, sealed bearings • Patented automatic chuck lock pin • Oversize armature shaft; hardened, ground, polished • Shockproof, bakelite housing • Dust filtered air cooling system • Dynamically balanced for vibrationless operation • Exclusive hanger hook • Weight only 13 oz

MOTO-SAW

THE *AMAZING* ELECTRIC SCROLL SAW



This electric coping saw works like magic! Easily cuts intricate scroll designs in medium-hard wood up to ¾" thick. Runs 7,200 strokes a minute . . . just guide it! Has only two moving parts . . . never needs oiling. Operates on 110-120 volt, 50 or 60 cycle A. C. electric current. As safe as a handsaw . . . thousands of satisfied users. Comes complete with 3 saw blades, at only **$5.85**

New DRILL PRESS

ONLY **$9.95** (Less Moto-Tool)

Only Dremel offers you a portable, precision drill press at such an amazingly low price. Just the thing for creating costume jewelry, model making, wood carving, routing, etc. Utilizes Model No. 2 Moto-Tool, which can be raised or lowered, swung in any direction, or quickly removed for off-hand use. Drill Press stands 12" high. Base is 6¾"x4". Weighs approximately 3½ pounds.

MONEY-BACK GUARANTEE

Buy Dremel Tools from your dealer. If he cannot supply you, use coupon below to order desired items on 5-day trial, money-back guarantee. Items checked will be sent complete and postpaid for check or money order in full. Or, send only $2 with order, and pay postman balance plus postage upon C. O. D. delivery. Remember, YOUR MONEY BACK if not delighted after 5 days' trial.

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MODEL No. 1

MOTO-TOOL KIT

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This highly popular Kit contains lighter Model No. 1 Moto-Tool and 34 practical accessories in attractive, lacquer-finish wood box. It's the biggest bargain in the field.

USE THIS COUPON TO ORDER

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- ☐ Enclosed find $_____ (Check or money order in full). Ship items checked below at once Postpaid.
- ☐ Enclosed find $2.00 as part payment on items checked. I will pay postman balance plus postage upon C.O.D. delivery.
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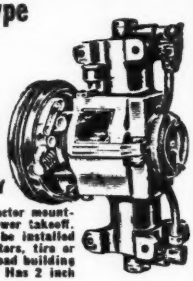

Designed for automotive truck or tractor mounting. Can be run off fan belt or power takeoff. Comes with automatic clutch. Can be installed for use on: farm trucks, jeeps, tractors, tire or garage service trucks, contractor or road building machinery, pneumatic devices, etc. Has 2 inch bore—1½ inch stroke.

Can be operated with ½ H.P. or more electric motor or equivalent portable gas engine.

Light weight, compact and versatile us!t . . . delivers "oil free air" . . . simple in operation; requires minimum of maintenance; operates under all climatic conditions; suggested operating pressure 75 P.S.I.; equally efficient operation in either direction of rotation; approx. displacement 3.27 CFM at 600 RPM, 6.54 CFM displacement at 1200 RPM; Overall dimensions: width 9", height 11⅞", depth 6⅝"; approx. wt. 23 lbs.

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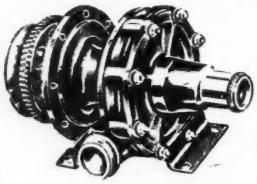
Complete with pulley and mounting brackets, ready for use.



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Has cast aluminum housing, accurately machined 5" bronze impeller; 3½" V belt pulley and mounting brackets. Shaft rotates on ball bearing; has grease gun fitting.

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[*Continued from page* 146]

'Dragon Fly' Hits 117 mph

Dear Editor:

Here is my original jet-powered model plane, *Dragon Fly*. Powered by a Dyna Jet engine, the model weighs approximately one pound 10 ounces and is capable of speeds up to and including 117 mph. The fuselage is made from ½"x¾" pattern maker's pine wood. The pod is hollowed balsa wood which contains a 5½-ounce gas tank made from a discarded lemon juice can. The wing is built up and planked with balsa.

To insure added strength I applied a covering of parachute silk which I purchased very cheaply at an Army surplus sale. The teardrop wing tips are solid pine and act as skids. The tail is $\frac{1}{16}$" plywood planked with balsa and covered with silk.

To fly the ship I use 50 feet of control line. Its take-off is about one-half circle; it is not necessary to use a dolly. All take-offs and landings are made on a ¼"x⅜" aluminum strip.

I find *Dragon Fly* very economical to run and much easier to start than a gas engine plane. I hope this photo will arouse interest among your readers that will lead to a larger field of competition.

Neal J. Patrone
238 Shepard Ave.
East Orange, N. J.

We hope so too, Neal. That's a sharp looking ship. Congratulations—and a $5.00 Workbench *Award—to you.*

Power-up FOR YOUR BEST SHOP WORK

POWER KING LOW COST TOOLS!

Shelves, cupboards, cabinets, tables, benches, bookcases . . . this is the power tool combination to make them quickly, easily, expertly — at only a fraction of the cost of store bought articles.

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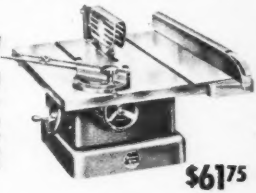
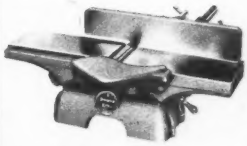


18"x20" precision-ground table gives you 10⅝" ahead of blade. Cuts 2⅝" deep. Blade tilts — table stays flat for safe angle sawing. Rip fence locks both ends. SKF ball bearings.

$61.75

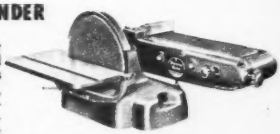


4½" JOINTER-PLANER

Planes, trues, rabbets, bevels, tongues, finishes — saves hours of work. 3-blade steel cutter head. Tables and fence accurately ground — fence tilts 45° both ways. SKF ball bearings.

$44.75

BELT AND DISC SANDER



Helps you end the time-wasting hard work of sanding. Sands boards of any length, width, or shape — angular or curved — plastics and light metals, too. 10" diam. disc., 4" wide belt. Table tilts 45° both ways. SKF ball bearings.

Send postcard for new free Power King Tool catalog.

$62.75

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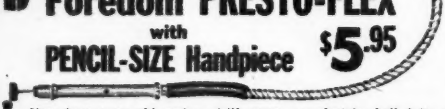
Foredoms handle hundreds of tasks. Use them for pleasure or profit, for tinkering or expert craftsmanship. Their versatility is unlimited. Use them to grind, polish, mill, engrave, sharpen, slot, rout, saw, carve, clean, sand, etch, cut, etc. Ideal for internal carving of plastics, the astounding new craft. You can work on wood, glass, plastic and all metals with a Foredom. No. 25 Accessory Set (A truly versatile assortment) only $5.50 extra.



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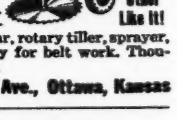

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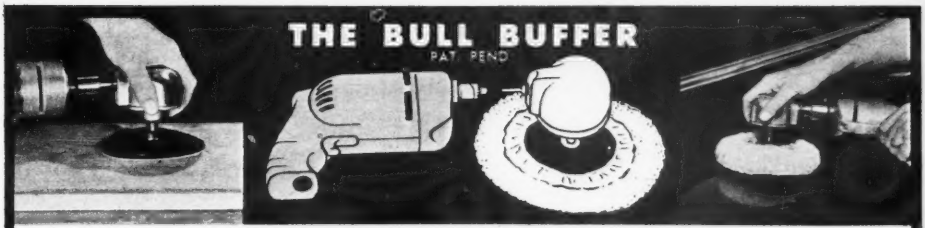

You polish and sand faster, easier—do beautiful *professional* work—with this amazing new attachment for your electric drill. And it more than pays for itself *the very first time* you polish and sand your car, floors, woodwork, furniture.

The Bull Buffer fits any chuck on an electric drill (or flexible shaft.) It's the only buffer you can turn *in a complete circle* while you hold your drill stationary. Reaches all curved and flat surfaces. It's packed with power, built of lifetime materials and *guaranteed.*

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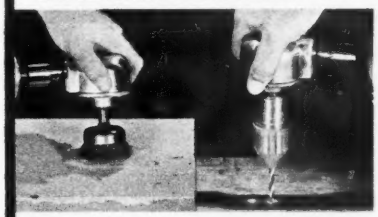
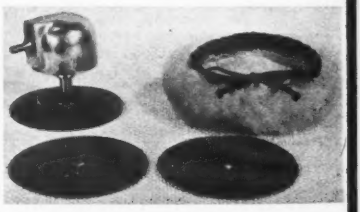


Cup wire brush attachment for removing paint, rust, scale, etc., $1.75

Jacobs key chuck increases ¼" drill to ½" capacity —reduces speed, increases power. $5.00

Bull Buffer car cleaner	$ .50
Bull Buffer car polish	1.00
Extra sheepskin bonnet	1.25
Extra sanding discs (000-00-0-1-2½-3-4)	.10
½" Jacobs No. 6425 key chuck (see photo)	5.00
2½" cup wire brush (see photo)	1.75

If your dealer doesn't stock, send cash, check, or money order for your Bull Buffer, complete as pictured below **$9.95**



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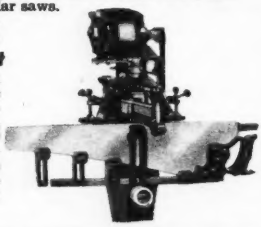

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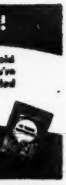

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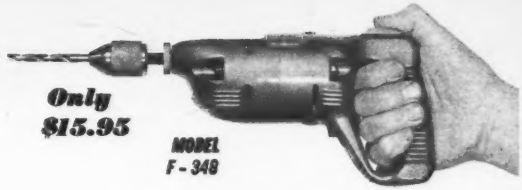

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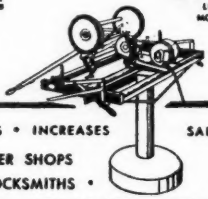

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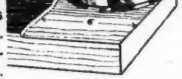

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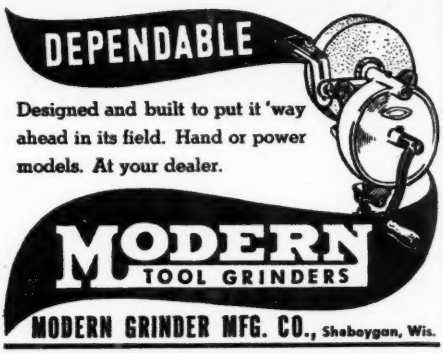

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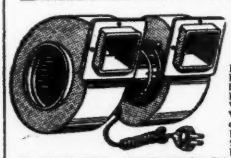

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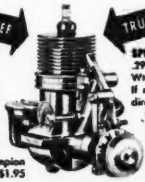

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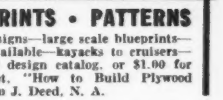

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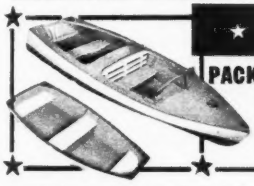

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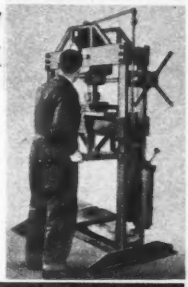

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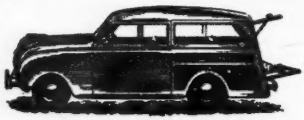

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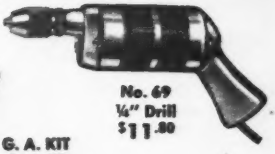

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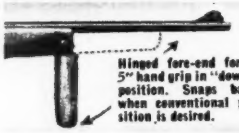

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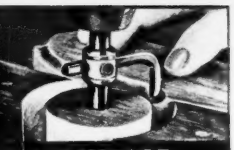

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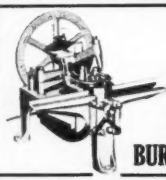

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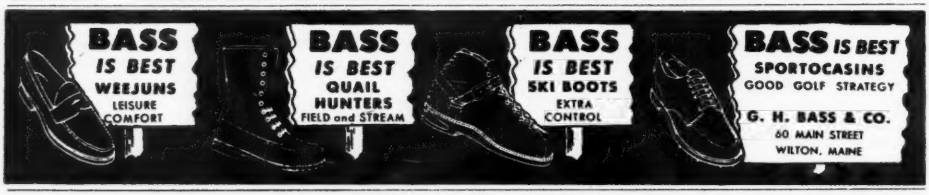

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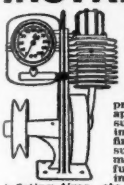

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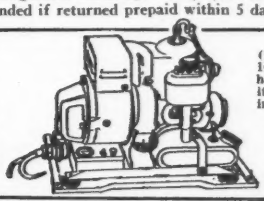

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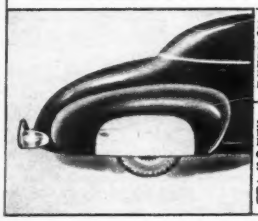

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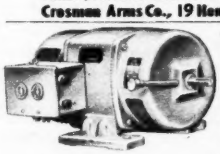

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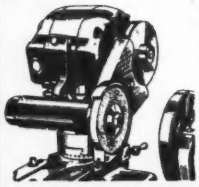

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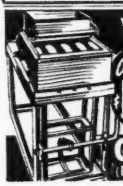

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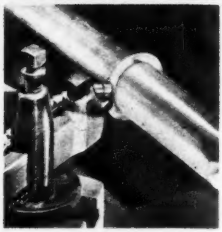
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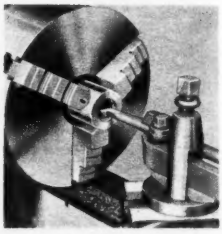
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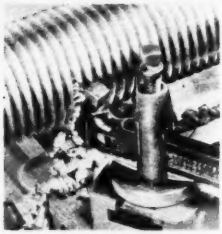
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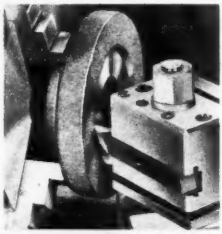
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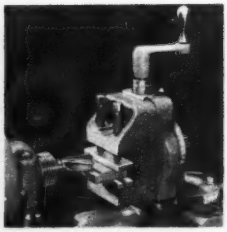
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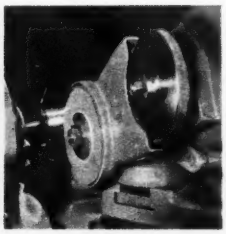
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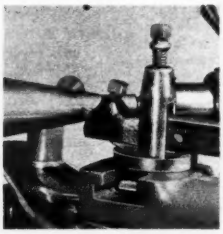
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